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DECISIONS

Double-Duty Databases



Can one Windows database satisfy the needs of developers and end users? We usability tested five databases. When we finished, one stood alone. 146 BRIEFING

Upgrading to Windows 95



How will your applications change when Windows 95 ships? What will Plug and Play do for you? We surveyed 90 vendors to find out. 178

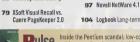
WHO SHOT WINDOWS 95? Pssst. Hey buddy. It's a conspiracy. Don't tell anyone. 324

THE PENTIUM FLAP: What went wrong, why it went wrong, and how you can fix it. 40

SNEAK PREVIEW . SNEAK PREVIEW . SNEAK PREVIEW . S

IBM Butterfly A remarkable subnotebook that will set your heart aflutter. 56

- 61 Panasonic PFC KX-SP100
- 62 Gateway 2000 Liberty
- Rn Primavera SureTrak Project Manager
- 104 Logbook Long-term tests.



Inside the Pentium scandal; low-cost color lasers; monitors on the wall; talking e-mail assistants, building WWW pages; Radar; and more! 40

Help

Crossroads Quarter-inch cartridge vs. digital audio tape-two backup options face off. 188

- 190 Working Smarter File formats and conversions.
- 198 Makeover Freelance.
- 200 Training Changing corporate standards.
- 204 Oo It Yourself Create an inventory database.
- 210 Q&A Tips and tricks.
- 220 Buying Smarter Backup strategies that work.



- 229 Direct to You Spec Watch configures graphics accelerators and more.
- 284 Product Index
- 286 Marketplace

PCC on the Net Get wired and check out our new World Wide Web home page. 313

- 313 I-Way Patrol Online back roads, security utilities, and PCC's Web page.
- 319 CO-RON That's entertainment: See a flick on disc with Ron White.
- 324 Ed Bott Is the Windows 95 delay all part of Microsoft's master plan?





Hit the road, Jack, and don't bother going back to the office. Pack everything into an overnight bag and hit the road in style. 322

REVIEWS

Datahook ThinCardOrive vs. SCM Microsystems SwapBox Classic Combo 64 Brother HI -630 73 Canon BIC-600e 74 Teac SuperQuad 4X AT CO-ROM vs. NEC MultiSpin 4Xe 74 MicroHelp UnInstaller 2.0 vs. Vertisoft Systems Remove-It Microsoft Visual C++ 2.0 86 Fractal Design Painter 3 88 Portable Software Quick Xnense 90 Raler Visual Raler 90 Inset Systems Hilaak Graphics Suite 92 Alpha Five 92

COLUMNS

MAIL: Rants and raves by phone, fax, and Net. 31

PAUL SOMERSON-Follow these steps to avoid making a seedy CD. 47

JOHN C. DVORAK: A license would be a wonderful thing to waste. 49

GIL SCHWARTZ: Faster than a misfired bullet, I still love my Pentium. 53

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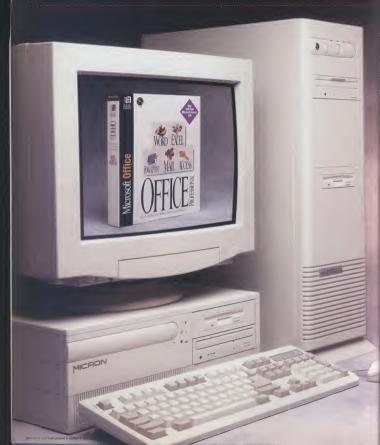
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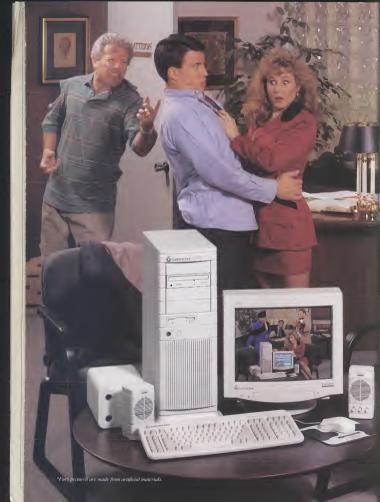
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With I

Setting: Lawyer's Office

Characters:

Jonathan Mattison: Lawyer Kiki: Young wife of Victor Victor: Kiki's husband who was presumed dead

Featured Galeway 2000 PC: P5-100XL with the new TelePath IIv fax/modem, IGB hard drive and quad-speed CD-ROM at a new low Price of \$3,799!

After the reading of the will, Kiki and Mr. Mattison lock in a passionate embrace. However, spec the resumg of the war, Kits and our manuson tack to a passimuse entities: 1000cm, they're unaware that Victor wasn't killed in the accident, and he has just arrived in Gateville.

Victor: Kiki! What's going on here? Unhand her, you beast! I thought you really loved me, Kiki! Now Anna tells me you're having an affair with my lawyer and you plotted to kill me just

Kiki: Why Victor! I thought you were dead! Anna lied! Victor you have to believe me. Of course I would love to have this potent PC with its powerful Intel® 100MHz Pentium "processor, course a would note to have this potent re-wait is powerful inter-to-main processor, whopping IGB hard drive, new TelePath* IIv fax/modem, 16MB of RAM, ultra-fast quad-speed managang seus nata unse, new reser aur us saonataun, soons or arin; untawas quau-spec CD-ROM drive, ACS-31 speakers with heart-pounding stereo sound, 17-inch Vivitron veolor monitor, and Microsoff Office Professional, Bookshelf and Money (inhale) all to myself. But at in new low price of only \$3,799 I could have easily bought it with my monthly allowance. Victor, to new now proce or only 20779 1 count nave easily tought with my mountary automatic. The your fall was an accident! We couldn't find you! We thought you were dead! It's been a whole your near was an account: The committening you. We thought you meter them: It a occur a manner wocks since you died. I thought it would be okay if I started dating again. I have needs, you know.

Victor: It was no accident! Some burly guy wearing a ski mask and a shiny three-piece suit shoved

Mattison: Cool it Victor. Kiki and I had nothing to do with your accident. Anna bribed me to read stratusons. COULTE VICTOR. Asks after Frage Intermediate to do with your according states on the area of the will. Man, was she steamed that you willed the P5-100XL to Kiki and she only got Fift, the Kiki: Yes Victor, I'm sure Anna hired the hit man.

Victor: This is terrible. To think my own daughter would have me killed. I must go rescue Fifi. And as for you two, I'll have you know Kiki, Mattison is your long lost twin brother! It would have only been a Mattison: Now that you mention it, I do see a resemblance . . .

Kiki: (faints)







Setting: Collapsed Office Building

Featured Gateway 2000 PC: The P5-75 Family PC with the new TelePath IIv fax/modem. 2MB of video memory and avad-speed CD-ROM for only \$2,299!

Characters: Julia: Successful Realtor

call for help with the onna ana rrevor ure uvers rapped in croniquea oque onituing. They coma etany — can for neity wan the PC's TelePath** Ily faximodem, but at the moment neither are in a hurry to be rescued. Julia is frisky, but Trevor's Trevor: Sexy Construction Worker Julia and Trevor are lovers trapped in a collapsed office building. They could easily

obsessed with her Gateway 2000® PC.

Julia: Trevor! How could you do this to me? You haven't paid any attention to me ever since we discovered my auna: 110-rol; 11000 canna yawaa unasa nee: 1000 narch-1300 aucanan and accordance are annee are unaccordance in Galeway 2000 PS-75 Family PC²⁰⁰ multimedia system. Are you forgetting about our love child? Come on! Love

Trevor: Not now Julia! I've just discovered even more bodacious features on this PC! She has a hot new Reference now now many is region underwand even undergondering scattures are under the new many and new TelePath IIV fax/modem with a Messaging Center. We could really use her out at the construction site. She neteratu ny navimonata wina a messagang senieri. We totany take net uni are ne tonistitutions and a receives, plays and saves voice messages and even lets you access your computer remotely and check for new in the rubble awaits us! мессичет, рызучаны заместчите шевандов ани ечен тем уом весем учит сопирым теннисту анаматель, али и voice messages. The Messaging Center can send faxes from any Windows³⁴ application that uses a print command and faxes can also be displayed, manipulated and edited, plus a ton of other really cool stuff.

Julia: Trevor, I never knew you were such a geck! Here we are, totally cut off from the rest of the world — it's

Trevor: Hot damn! This PC is a beaut! She's been souped up with an ultra-fast quad-speed CD-ROM drive and the perfect time for love. Come to me you stud muffin!

2MB of video memory — it's faster than grease lightning and a great value at only \$2,299!

Julia: Why Trevor, you've made quite a discovery. These new features plus the powerful Pentium** processor, an immense 730MB hard drive, 15-inch Vivitron monitor, 16-bit sound card and Alec processor; air maneuse: 1-Juviso natu wiive; 15-4 meur syvanum — montor; 140-400 author and a mare specific processor; 140-400 author and 140

Trevor: We have to get out of here! I'll use the modem on the TelePath IIv fav/modem to call for help. I have to get to a phone to order an anchovy pizza and a PC from Gateway 20001. I need to ask how Bob's doing, too. Gateway is such a great company! I can't wait to get my own PC. I'll get a 30-day money. back guarantee and a three-year warranty on parts for my desktop PC and monitor. Gateway will provide me with technical support for the life of my PC, and on-site service is available during the first, year in nos U.S. locations. They'll even send me a free written copy of their warranty if I request it.

Julia: That's it! You'll need your own PC because this one is history! Trevor: Stop! How could you even think of destroying this incredible machine?

Julia: Trevor, my biological clock is ticking. This may be our last chance! We can fax for help afterwards and then you can order your own Gateway PC. Trevor: Geez ... Julia. Okay, but you're kinda a mess.











Featured Gateway 2000 PC: 4DX2-66 Family PC multimedia system with a double-speed CD-ROM, new TelePath IIv fax/modem and six exciting Microsoft software applications for \$1,799!

Setting: A fancy living room in a stately home.

Characters: Dirk: A debonair businessman Sheryl: Simone's evil twin sister

Dirk was enjoying a cocktail when he suddenly sensed something was ferribly wrong. At the same moment, his wife suddenly whips off a wig revealing that she's Simone's evil twin sister. Dirk: Sheryl what have you done to me! Where is Simone?

Sheryl: Simone is gone Dirk. Just like you'll be in a few seconds. I poisoned your martini. Suerya: Simone is gone Date. This time you it to it a new servinus. I prinsoned your manuar it want your Gateway 2000s 4DX2-66 Family PC** multimedia system for myself. Simone always want your caneway 2000 - 2002 con ranny r miniments system for myself: simule away had everything. Flowing aubum hair, a rich husband and a PC that she didn't even appreciate. I nau crosyning: *nowing aurum nau, a neu mostanu anu a re- una sue onus e even appreome: desperately need this PC for my eight children. With Microsoft ** Encarta*** 95, Penelope will uesperanesy neeu uns re-tos my eign eumateu- vom moreusou, eumateu 2007 europe with flourish in fler studies at the Galeville Junior Academy, and Polly can develop her budding creative tousissing ner squares as one concernic summy awarency, and rong can develop mer containing creative tallents with MS Fine Artist. Chester can track his stocks with MS Money, and Cartion can use the spreadsheet in MS Works to track his pet jeunna's feedings. The rest of the kids can check out spreasures in MS Works to truck its per aguatia's rectange.

The rest on the King can caree to a movies on MS Cinemania 193 and sharpen their golf game with MS Golf. The 4DX2-66 will norms on wis Chemania — 22 and smarpen mear gon game with vis done the Publication will be graphed and smarket. If my plan works they'll all support me by

Dirk: You offed Simone?! Why didn't you tell me? I've always loved you. Simone was a raging

Data: Tou vited somme: may drum tyou tentine — I ve divays noved you. Somme was a raging hypochondriae. She drove me nuts! Quick, get me an antidote. We'll live happily ever after together! Sheryl: You love me? Maybe Simone sensed it and that was why she always said she was me.

Dirk: Sheryl, the antidote, please! I'll give you anything you want. I'll come live with you in Canada! Sheryl: Oh how sweet. But would we be able to stay in contact with Gateway 2000?

Dirk: Of course! Gateway customers in Canada and Puerto Rico get toll-free telephone service along DITE: OF CURRET VARIEWAY CUSCORERS IN CARROLS and FIGURE OF SECTION FROM SECTION SET VICE AROUND WITH ECHNICAL SUpport. Plus, Gateway has a non-resident importer plan with Canada for easy delivery, and on-site service is available in some Canadian and Puerto Rican locations.

Sheryl: That's nice Dirk, but Γ m afraid it's too late. Γ m flattered by your offer, but Γ d rather have this one year and a since which our remaining it accounts the managery of your ones, our resource makes all 4DX2-66 all to myself. Plus, I'll have this house and everything you own since I'm a dead ringer for Simone with this wig. In fact, my eight kids are on a flight to Gateville as we speak.

Dirk: You forgot (gasp) one (choke) thing. I'm (cough) taking (wheeze) my Gateway (choke) customer (cough) I.D. (gasp) to my grave! (THUMP) Sheryl: AUUGH!







4DX2-66 FAMILY PC

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- 8MB RAM
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P5-90 FAMILY PC

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P5-60

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- PCI Enhanced IDE Interface ■ PCI Local Bus Graphics with 1MB
- Quad-Speed CD-ROM Drive
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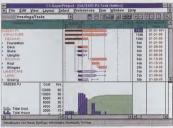
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THE GOOD, THE BAD, AND THE PENTIUM

Marketing Miscalculations

he good news is that Intel has finally agreed to replace all (not just some) of the Pentiums with the floatingpoint division problems. The bad news is that Intel has not had a real change of heart—it continues to assert that this is a minor problem, although customers think otherwise. Worse, Intel has failed to acknowledge that it was wrong to hide the problem in the first place. The questions the press should be asking are: Will Intel make timely disclosures of all problems in the future? Are there any other Pentium problems that Intel has failed to disclose?

> IOHN NAVAS Dublin, California

Adding Up the Future

Intel needs to look back in recent history to two computer companies that "ruled the market." Hayes Microcomputer Products and IBM once both dominated their markets. The words "Haves compatible" and "IBM compatible" were stamped all over, and we still see it today. These two supercompanies figured that whatever they introduced would become the compatible, but they were dead wrong. Now both companies find themselves struggling. Doesn't Intel realize this pattern in the PC industry? Just because you dominate the market doesn't mean everyone will follow you.

> PAT McCusker PMCCUSKER9@AOL.COM

Bad Math, Bad Rep

I base much of my reputation on the facts that I get from your magazine. The question is: Why didn't you get the inside info on this Pentium flaw? I'm in charge of buying equipment for a major industry. Can you tell me more about the Pentium chip's potential errors?

> ERNEST K. HUNTRESS CIS: 75603,2650

REST ASSURED that your reputation could never sink as low as Intel's has in recent months. Why didn't we find the flaw before the math professors in Virginia or Intel's employees? Our tests didn't include "at risk" floatingpoint calculations-mainly because nobody outside Intel knew what they were until recently. Depending on whom you listen to, errors turn up between once in 9 billion divides or once in 100,000 divides-and we didn't uncover them in our tests. However, we do offer more information and quick fixes in this month's Pulse section on page 40. ML

The Internet Edge

Let me compliment you on the "PCs at the Crossroads" feature (January, page 166) by Howard Baldwin and Liesl La Grange. They're really on top of the computer and communications industry. But I have a question about your online offerings. You mention a few freeware and shareware items, but only make them available on CompuServe! Why not set up an Internet site and provide anonymous FTP to these files, as well as set up a World Wide Web server? The January issue addressed future trends. My guess is that any company that doesn't have a Web server in three to five years will be behind in its competitive edge for customer promotion and access.

> TED MCMICHAEL TED@MITRE.ORG

YOU CAN ALWAYS reach us here at PC Computing via CompuServe. MCI Mail, or the Internet, As for downloading files, in addition to PC Contact, we now have a Web page called PC Computing's Web Edition which provides files that you can ftp anonymously. Reach us at http://www .pccomputing.ziff.com/~pccomp. RS

We Speak Your Language

I just received my January issue and was very impressed with "PCs at the Crossroads." This combination of graphics and text makes complicated material easy to assimilate and digest. It's the kind of stuff that made me decide against the loquacious and voluminous prose of other magazines and opt for PC Computing instead.

My only suggestion would be to identify the acronyms. What do CISC, RISC, MPEG, INDEO, and SCSI stand for? I understood the concepts in no time (because of the excellent and simple graphics), and understood what the authors were getting at (because of the concise text), I look forward to this feature in future editions.

MICHAEL COX

YOU'RE IN LUCK, Our Crossroads section in Help regularly delves into the emerging battles of computing technologies-and sheds light on the related acronyms. This month on page 188 we discuss QIC (quarterinch cartridge) and DAT (digital audio tape) technologies. JOC

Obsolete and Now Free

Bravo! I finally found a John C. Dvorak column that deserves my support. ("Free the Code," January, page 75). If DOS is to Mail

Hole in the Net · Hell of an Article · Penn's Disappearing Trick

be dropped by Microsoft—and I fear Drowak is all too accurate in his forecast then Microsoft needs to give something back to the public. I vote for making DOS public-domain software. Windows has a long way to go before it meets my needs and desires. Istill like my many DOS programs, especially WordPerfect. Let all DOS users ally behind Dovak and tell Microsoft it's time to pay dues as a corporate citizen of the world!

> RON STOTYN GR9136@SIUCVMB.SIU.EDU

Caught in the Net

Your January "L-Way Patrol" refers readers to many cool files (page 307). But there is no file titled netite.zip at ftp booklink, and no file at ftp garbo.uwasa.fi named gogame. I checked all directories at those locations. What's up?

M. Melanson trollone@aol.com

AS YOU PROBABLY REALIZE, the internet is in a constant state of flux, and many things change between the time we go to press and when you read the magazine. BookLink Technologies FTP address is now correct; look for a file called beta4.zip. Part of the delay was because America Online purchased BookLink Technologies after we went to press. As for the game, go to http://www.loylou.edu/games.html, or find it on PC Contact, data library 8 (Misc.). RS

Hotel Hell

I just finished reading "Notebook Hell" (January, page 124). I appreciate your tests that try to replicate "real" work environments. I currently use Compaq's LTE Elite and agree that it's a great machine—excent for the mouse.

Too bad hotels are still in the dark ages, Nothing is more frustrating than being in a hotel room and having to pull out the bed to unplug the phone so you can connect your computer. When will the hotel industry understand we work on our computers! A data port is not enough. How about a free outlet near the phone jack? Or have the phone on a desk rather than the night table? I hate having wires criss-crossing my hotel room and then leaping over them to go to the bathroom. Not all hotels are bad, and it is a real pleasure when you stay in one that understands. I just wish it were more commonplace. I hope they are listening to their clients.

Andrew Lickly andrew@ftp.com

More Hell, Please

I liked "Necebook HeIJ," but hey, what happened to the real tough tests like the clothes dryer gauntle? I think notebooks need a good shake-up to find out if the manufacturer bothered to solder everything properly. It is precisely because you have the guts to really torture notebooks that I decided to choose your magazine when it came time to subscribe. Keep up the sound work.

Imants Baruss London, Ontario, Canada

Telecommuting Breeds Diversity

Just wanted to let you know that your magazine is not only read by young males. I am an active member of SeniorNet online, teacher of computer courses, and agree with John C. Dvorak's column about telecommuting ("Domestic Bliss," December 1994, page 75). It's the wave of the future. The greatest degree of job discrimination is based on age. Telecommuting would help eliminate this problem, because no one can real if the person telecommuting is 8 or 80.

CONNIE ACTON CONNIE ACT@AOL.COM

TRUE, ALTHOUGH references to SeniorNet might give you away. JOC

Apples and Blueberries

Paul Somerson's "Rupture Relief" column (December 1994, page 67) does a good job skewering the "coming rupture" prophecies expounded by Apple executives. It's also a good summary of where Apple may be headed. But there are a few debatable points.

First, it's not accurate to compare the Macintosh market share to that of Windows. Apple must sell a computer with its operating system, whereas Microsoft only has to sell a few disks. Buying into the Mac world represents a significant investment, but buying into Windows is a no-brainer. A lot of Windows users never choose to use Windows at all. It comes preinstalled on PCs.

Second, some users run Windows only to play games. Yet they are counted as Windows users, and those machines are counted as part of the Windows market share.

Third, only time will tell if Apple was too late licensing its software, or if it should have done it at all. The IBM licensing deal makes good press, but Apple and BBM have been working jointly (and apparently in vain) on the Taligent operating system for several years. If sa yanone's guess what IBM will do with the Macoperating system.

Apple is primarily a hardware manufacturer. Microsoft is primarily a software publisher. In a one-dimensional summary comparing market share, it appears that the two companies are competing in the operating system arena. But that's an illusion.

GREGORY JORGENSEN

Kudos to the Tag Team

Thanks for publishing articles by Vincent Chen and Woody Leonhard in the Holp section! I thoroughly enjoyed and "programmed" their articles over last several issues of PC Computing. I will remain a regular subscriber as long as their articles find the way to your pages. Their easy style is a boon to this novice programmer, and their suggestions are extremely useful.

GREGORY Y. CHANG, M.D. GYCHANG@HSC.USC.EDU

Uma's Revenge?

Where is Penn Jillette? I just opened my January issue and turned to the baye page—auagh, an al! Did Penn upset the wrong people? Did the editors finally figure out that he never wrote about computers? Did Uma Thurman e-mail a complaint? Did the government read his column on censorship and shut him down? You cart just stick a puge of advertisement on the last page and not even mention why that page doesn't have Penn's column. What happened to Penn Jillette?

LARRY TANNER
LARRY, TANNER@NETEAST.COM

Those PCs you were looking at yesterday have just become yestérday's news.



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CREATIVE DIFFERENCES? A

vanishing act? We can tell you it wasn't Uma's law suit or intervention from the Feds. We thought it was time to cultivate a new conspiracy theory. And based on all the Internet gossip, it seems we got just that. We suggest you check out Ed Bott's irreverent and informative insider's countdown to Windows 95, which now adorns the back page. JZ

Mightier Than the Penn

While I'm sorry to see Penn Jillette disappear from your back page, I really won't miss him. Gil Schwartz is a lot funnier and gives me useful information to boot.

> BRYAN KIMSEY BARTMSEV@AGE COM

Will Use Unix to Multitask

After reading the "obligatory" OS/2 and DOS/Unix letters (Mail, January, page 28). I have to agree that if someone wants a powerful, full-multitasking environment, they should look at Unix. It may be difficult to use at first, but after a few weeks it gets easy to use. I have been using the Slackware version of Linux for the past two years and have found that it can be very helpful. It comes with full TCP/IP support of both SLIP and PPP, while having many good Internet programs (such as Mosaic) for X Windows (the only real Windows) It has its drawbacks, of course. but it's the best I've seen. Besides, it is free from the Internet at sunsite unc.edu.

MIKE PLEMMONS CIS:72603,1405

Clarifications

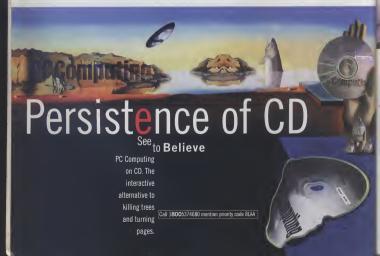
In the February feature, "The Ultimate Bargain" (page 124), the price for Zeos International's Pantera 90 should be \$3,695.

In the "Notebook Hell" feature (January, page 124), the estimated street price for AST Research's Ascentia 900N system should be \$5,098.

In the December 1994 "Editors' Choice" feature (page 150), it should be noted that Lexmark's Classic Touch keyboard with the "eraserhead" pointing device is available only for the PS/2-type bus.

In "Editors' Choice" (December 1994, page 191), the e-mail address to get Mosaic should be mosaic-win@ncsa.uiuc.edu or you can telephone NCSA at (217) 244-3473.

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WINDOWS 95 MYTHS Windows 95 is due to ship sometime in the late summer or early fall. Its proponents have floated all sorts of promises about what the new operating system will do. We ell the real story behind the top ten most widely misunderstood myths, lies, and misconceptions about Windows 95. Knowing the truth may influence one of the most significant upgrade decisions you have to make your work of the most significant upgrade decisions you have to make your work of the most significant upgrade decisions you have to make your work of the most significant upgrade decisions you have to make your work of the most significant upgrade decisions you have to make your work.

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Online Wave: Consumer services-e-mail chat sessions, and database surfing-are the smallest slice of the \$11.33 billion. online pie, but they're the fastest growing.



Pick a Card: Falling flash prices are changing the way that portables remember, PC Card sales overall will increase tenfold to \$5.8 hillion by the turn of the millennium.



Empty Toolbox: In 1993. 47 percent of U.S. jobs relied on a computer. Although 39 percent of households with kids have PCs, not everyone is getting this important tool. CHIP ERRATA

Pentium Happens

It's old news, but that doesn't mean the Pentium furor is history. Intel expected that owners of no more than 20 percent of the three million to seven million faulty Pentium chips would exchange them. So how do you know whether or not the Pentium you just bought (or want to buy) is one of them? And even if the processor is flawed, is the issue just a storm in an FPU?

It was hard to tell fact from sensationalism in the media frenzy that erupted last winter. Intel fessed up after the error was exposed by academics and said it had fixed the problem. Pentium owners were livid that they had never been informed.

Intel claimed that the average user would get a miscalculation once every 27,000 years. IBM came up with a different figure-once every 24 days-and halted their sales of Pentium PCs. NexGen reported an "avalanche of demand" for its Pentium-clone Nx586 proces-



Unrepentium Inside: Test your Pentium with this equation. The correct answer is 0; if you get 256, your chip is flawed.

sor from PC vendors. Meanwhile Pentium ads continued to air on TV, and online services were flooded with gripes and swipes at the would-be chip monopolist ("At Intel, quality is job 0.99999998"). As a result. Intel set aside \$420 million to replace Pentiums-and boost their flagging stock prices.

So what's the problem with the Pentium? The floatingpoint division that trips up suspect Pentiums fails with "at

risk" numerators and denominators-namely those with binary representation that has long strings of consecutive 1s. To complicate matters, a number like 3.0 isn't at risk, but the result of subtracting 1.1 from 4.1 is. Intel's estimate of 27,000 vears between failures was reckoned on 1,000 divides a day at one bad divide in 9 billion. IBM noted that spreadsheet recalculations can perform 5,000 divides a second. At 15 minutes

UPDATES

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of recalculation a day, you'd rack up 4.2 million divides—or 9 billion in 24 days.

While you may not recalculate for 15 minures every day, you're not out of the woods. An independent study at the University of California, Berkeley, came up with a Pentium floating-point error rate of one in 1,000 with "at risk" figures, and a typical error rate on the order of one in 100 million about twice the error rate originally estimated by Intel.

All Pentium systems purchased last year include the flawed chip. At the time of this writing, Intel was already shipping a corrected version of the chip may linger in the dealer channel for several months. Fortunately, software and hardware fixes for the flawed chips are readily available.

If you have a Pentium, check it with some simple math (see illustration) or download a utility from CompuServe. PC Magazine's PENTIUMEXE and PENTIUMWK1 test Pentiums using either Visual Basis 3.03 DLL or your favorite spreadsheet. You'll find both utilities in the file PENTSIZIP in Ziff-Nc's Executives Online forum (GO ZNTENEC). See page 316 for log-on instructions.

If you discover that you're at risk, download a software fixto turn off the offending FPU (Eric Issaeson Software's FPUOIFF ZIP, also on Executives Online, is a good choice). Turning off the FPU means you'll take a performance hit, so you should also call Intel at (800) 628-866. The company will send you a replacement chip (if you want to do the upgrade yourself) or refer you to an Intel service center where a technician will perform the swap for free. Mt.

Beam It to the Printer, Scotty

Now that infrared (IR) ports are turning up on portables from IBM, Gateway 2000, and Hewlett-Packard, why not **cut the wires** on printers? Extended Systems' **JetEye infrared transceiver** attaches to the parallel port of any printer so **IR-equipped portables** can beam jobs to them. A serial version, JetEye PC, transfers **data files**.

JetEye and JetEye PC / Extended Systems / (208) 322-7575 / \$179 and \$135 est, street price, respectively / Reader Service No. 667

Desktop Color

First a dream, then an expensive reality, color lasers now cost less than \$10,000. The desktop models we found range in resolution from 300 to 1,200 dpi and support various page description languages. Prices listed are as of December 21. 1994.

Product	Price
HP Color LaserJet MBS, (800) 944-3808	\$5,499
Xerox 4900 Color Laser	\$7,988

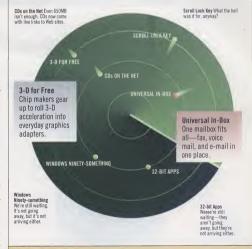
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RADAR 32-BIT MULTITHREADED WATERTREADING



What's on the Scope? If it's near or moving toward the middle, pay attention to it. If it's moving off the screen, forget about it for now. Your time is too valuable.

The Forecast for Monitors Is Flat

The future is flat, if the latest crop of active-matrix LCD monitors for desktop PCs is any indication. Trim, low-powered, and free of potentially harmful electromagnetic emissions, flat-panel displays are a space-saving alternative to conventional CRTs.

To that end, CTX offers the 9.4-inch active-matrix CTX LMT-5020, which displays up to 4,096 colors at VGA resolution (640 by 480 pixels). The 5.5-pound panel comes with a sleek collapsible base or can be mounted on the wall.

Slightly more onscreen real estate is offered by the 13-inch NEC LCD1280 (which supports resolutions of up to 1,280 by 1,024 pixels at 16.7 million colors) and the 10.4-inch color Sharp OD-100MM, Radius is also at work on a variation of the flat-panel display that supports resolutions of up to 1,024 by 768 pixels. The LCD will use Radius's pivoting technology so the monitor can be oriented in either landscape or portrait modes. Radius expects to ship the rotating LCD later this year. WT

CTX LMT-5020 / CTX Int'L/
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TelaNophy / Active Voice / (206) 441-4700 /

TeLANophy / Active Voice / (206) 441-4700 / from \$4,500 est. street price / Reader Service No. 613 The Call Opens the big State of the Call Opens the Call Open

INTERNET ASSISTANT

Word Processing on the Web

How hot is the World Wide Web? At the current rate of growth, it's probably only a matter of time before every human on the planet has his or her own Web page. If you haven't gotten around to creating yours yet because the tools are too hard to use, it's time to find another excuse.

At press time, Microsoft was scheduled to release Internet Assistant by the end of January. This free add-in lets Microsoft Word for Windows read and write files in Hypertext Markup Language (HTML), the universal cross-platform Web document format.



Vanity Press: Microsoft Word's Internet Assistant connects directly to Web sites such as the Microsoft Home Page.

The straight ASCII formatting codes in HTMI. aren't particularly complex—alphanumeric identifiers inside angle brackets define fonts, graphics, headings, and links to other Web sites—so adding Web support to Word is not much more difficult than adding a new import filter. And that means you can expect similar features from WordPerfect and Lotus before long.

The no-frills Internet Assistant lets you create Web pages by using Word's text formating tools. To add graphic, just drag the file out of File Manager and drop it onto

the page. To add links, paste in the URL. You can also use Word and Internet Assistant together as bare-bones Web browser, although it will be more useful as a way to share interesting Web documents with cyberphobes.

You won't want to use Word as your full-time Web browser, any more than you'd use Excel to build an airline reservation system. Mosaic and NetScape will continue to be the tools of choice for dedicated Web surfers, Internet Assistant doesn't include tools for maintaining Web servers, so after you've created a stack of Web pages you'll need to find a home for them on a Net-accessible server. Watch for more complete Internet tools for word processors, spreadsheets, and other core applications to emerge from the Novell/Word-Perfect alliance as well as from other companies.

Internet Assistant will be downloadable from Microsoft's FTP site (ftp.microsoft.com) and a variety of other sources, including the major online services such as CompuServe and America Online. EB

Internet Assistant / Microsoft / (800) 426-9400 / Reader Service No. 614

Contributors to Pulse: MATTHEW LAKE, MIKE HOGAN, ED BOTT, JAMES OLIVER CURY Edited by WENDY TAYLOR



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PaulSomerson

SEVEN CD SINS



The like to get our hands dirty around here. We like to crawl under the hood and strip systems down to the solder. And our lab guys love squeezing software until it screams. But there's a special appreciation you get when you actually build a product from the blueprints up—which is what we just did with our new CD-ROM. And jeez, did we learn from it. (In case you haven't heard, users are

calling the new *PC Computing* CD-ROM an honest-to-goodness breakthrough, a truly interactive multimediafest, a glimpse of what magazines will be like in the twenty-first century. Copies are limited, so if you want to get your hands on one, call (800) 537-4680 *really soon*).

So here's our first-hand CD-ROM buying advice. Avoid the following CD sins:

CLUELESS CONTENT. Too many brain-dead vendors simply "repurpose" old material and trot it out again on plastic. Face it: Nobody wants to sit in front of a screen scrolling through text and bitmaps that look better and are easier to read on paper. Vendors need to create entirely new material with interactivity and multimedia in mind.

IRRITATING INSTALLATION. Cheesy installation routines become confused by even common hardware configurations, or ask users for technical data about their systems that they can't possibly know. Or leave enormous footprints on their disks. Or pollute system files and settings. Or make it hard to uninstall cleanly.

IDIOTIC INTERFACE. The worst offenders are the ones that rely on Windows 3.1 as the main interface. Even Microsoft (which is flogging new, improved Windows 95 features) now admits that this is a big mistake. CD interfaces are too often

too complex and inconsistent, or rely on tiny cryptic icons or unintuitive Windows menu choices. Who needs this aggravation?

NONEXISTENT NAVIGATION. What's the point of having any information on a CD if you can't get to it? Too many CDs expect you to be mind readers (or worse—manual readers) who know what areane commands you need to get anywhere. And most CDs make it painful to iump instantly to a favorite location or feature.

INSIPID INTERACTIVITY. We see this all the time. "It's interactive—you select a menu choice and you get a screen of text! Then, you just press the Page Down key and you see more text!" Wrong. That's not interactivity. That's just typing.

DUBIOUS DISCOVERABILITY. CDs sometimes offer terrific features that you'll never find because the vendor turned the disc into a treasure hunt, and you'll never fathom the twisted logic required to pry out the good stuff.

MURRY MULTIMEDIA. Sorry, but multimedia is not just tossing in canned trumpet fanfares. Or offering the same old "I have a dream" or Neil Armstrong moon dance clips. Vendors: Integrate voice, video, and sound the way they do in Hollywood. Or on TV. Be imaginative. But don't insult us, please.

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- Microsoft Mouse \$2095 486DX2-66 \$2395 Pentium-75
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- graphics card with 2MB VRAM upgrade 15" SVGA color monitor upgrade
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486DX2-66

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- ➤ 340MB hard drive
- 3.5" 1.44MB floppy drive VESA local bus SVGA color video ➤ 14" SVGA color monitor
- 4-bay desktop case ➤ MS-DOS. Windows for Workgroups.

- Microsoft Mouse





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- Editors' Choice: ➤ 16MB RAM, 256K SRAM cache
- ➤ 528MB local bus IDE hard drive ➤ 4X CD-ROM drive, 3.5" 1.44MB FDD Diamond Stealth 64-bit PCI local bus
- graphics card with 2MB VRAM upgrade 15" SVGA color monitor
- ➤ 6-bay desktop case ➤ MS-BOS, Windows for Workgroups,
- Microsoft Mouse ➤ Lotus SmartSuite \$2745 Pentium-75 Pentium-90 \$3095

Pentium-100 \$3295 **Hottest Pantera:**

The above system modified to include: ➤ 1GB local bus IDE hard drive

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➤ 24MB RAM ➤ 1GB local bus IDE hard drive

➤ Altec Lansing high-power speakers



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Ye been writing a Q&A column for some daily newspapers, and for a number of years I did call-in type talk shows about computers. There were two questions that cropped up every so often. The first was always from someone who had just found a cheap used 286—or even the once-famed "turbo" 8088 machine—and they wanted

to change from DOS 2.1. They wanted a copy of DOS 3.3 and wondered who sold old copies of DOS. The second question was simple but in some ways more interesting: "I just bought the WordPerfect upgrade. What should I do with the old copy? I'd like to give it to a charity or sell it to someone who could use it."

The answer to these questions was always a lecture on how software is licensed not sold, and how you can't give away or sell the old copy. The simple fact is that the notion of licensed software is now outdard. There is no reason that an old copy of Ami Pro, Word, or WordPerfect shouldn't be sold to a pal for \$10 or whatever it's worth. Same for DOS and other programs.

The concept of licensing PC software was initiated by Seymour Rubenstein, founder of MicroPro (later to become WordStar International) as a stroke of genius. The idea was to minimize pass-around copies and piracy, as well as lock a customer into certain rules about usage as outlined on the license agreement. It was really aimed at businesses that had to buy a copy for each machine in the office.

Licensing Is Passé Although the software license was important when the industry was a fledgling business and it was easy to lose money, it is no longer useful. While companies such as Borland International and others have loosened some aspects of their agreement (users can run the same software on their personal laptop, for example) the whole licensing scheme should be abolished. These products are now more like Nitmendo cartridges than \$15,000 minicomputer line clittors. Furthermore, toda's new user has

no clue about what the license means and responds more to the cornball "don't copy that floppy" message than to any wording on the back of a license agreement. Worse, licensing makes everyone a scofflaw. If someone has two machines at home plus a laptop, they aren't buying three copies of everything. It's idiotic. Software has become a personal possession, not a licensed artifact. "This is my copy of Word. I'll do with it as I please."

This is how dumb it has become: Under some agreements I'd have to buy four copies of a package to run on a single-user, four-CPU power machine! The software is licensed to a single CPU, after all.

Then there's the practical aspect. As software has become a multimillion dollar business, prices haven't plummeted. Sure, things are a bit cheaper. But Word could sell for \$15 and still make money. It outsells platinum music CDs. Why should it cost more than a music CDP And if a recording artist comes out with a new release, I can give away or sell my old one.

Why can't I do this with WordPerfect? I still recall ex-Microsoft honcho John Dickerson making the public comment to the effect that selling upgrades is sinfully profitable. If that's true, then why can't users recoup some of their losses by selling the old version to 8088 users who need the program? Since most software companies now charge for support, it's also a way to get more money to flow into the support profit center!

CD-ROM Solution Of course there's the fear that General Motors will put one \$15 copy of Word on the network and that will be all Microsoft ever sells to GM, But a serial number program that doesn't allow more than one copy of a package to run at the same time would help and be enough of a nuisance that GM would have to buy more copies. Or, better, network killers that simply won't let the program run on the network at all. Each workstation would have to have its own CD-ROM. This latter notion (and note I said CD-ROM) is the future of personal computing. The idea that employees would bring their own tools to work has been minimized by

fears of piracy and viruses, and by the dubious need to standardize. Two of these notions are eliminated by CD-ROM-based software and the abolition of software licenses. As we move to CD-ROM-based software, the perception will change and the idea of selling used CD-ROMs without concern for licenses will come.

In the most recent software piracy case I have researched, the entire licensing notion and computer software copyright restrictions were seen as ridiculous. This is the case of David LaMacchia, the MIT student who set up a pirate board. The case was dismissed because U.S. District

Judge Richard G. Stearns said that by letting the case go forward it would open home computer users to prosocution for copying even a single program for personal use. In essence, Stearns saw that what we currently have in the way of laws and license agreements is simply ludicrous.

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Pentium-60	\$1645	Pentium-60	\$1945	Pentium-60	\$2445	Pentium-60	\$2845
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You can imagine how upset I was when I realized that my Pentium didn't work. I spent enough money on it.
That was a couple of months ago, six or seven minutes before I learned that the thing was a complete dud. I was mad, and I don't mind saying so. I had big plans for that machine. Now it's clear that it's never going to live up to my hopes for it.

Since the bad news came down, the guvs over at Intel have decided to come clean and cough up a new chip. I'm thinking of taking advantage of their kind and generous offer. Before I do, though, I think I should probably take stock of the things my stillrelatively-new machine can and cannot do:

It can load the 645 TrueType and ATM fonts on my system in a little under 20 seconds. My 486 did it in a little over 2 minutes.

It can load the entire annual report copy with scanned photographs and financial charts into OuarkXpress 3.3 in a little under 45 seconds, and scroll through the document as one would through actual paper. No more wading through the document like a foot soldier on patrol in the big muddy. I'm airborne.

It can load in the entire financial database of my billion dollar corporation, which is made up of 19 separate business units in 30 states. Each operation has its own section, with a six-year history going backward and projections through 1997 cross-referenced with assumptions about inflation, cost of money, and several other key variables. The document is so prodigious it used to be accessible in total only to machines running off the glacial mainframe huffing along somewhere in the wilds of New Jersey. Today I can pump in the entire massive numerical edifice and watch it spin and twirl. Nothing crashes. And if the occasional number is 0.0000000001 wrong, that's still a lot more accurate than the majority of our controllers, who think nothing of adding a couple hundred grand to their estimates of the bright and glorious future when they need things to balance out.

It can run CD-ROMs smoother than I

ever dreamed possible. I thought it was the medium that was inherently flawed. Turns out it was my computer. Now sound and video modules run concurrently and everything. And 3-D solids move through space. Music plays without that gargling of razor blades effect well-known to all owners of 486s, Multimedia presentations flow with clarity and smoothness. Transitions work, Builds build, It can pop 3-D bar

DEEP THOUGHTS

waiting the

vears for my

still WAITING ...

a half to go.

graphs without painting them segment by segment on the screen. This is something new, in case you don't know.

Best of all, when the work day is done and important matters must be attended to at home, my Pentium can run the upper levels of Doom without coughing up blood at the end of the floor when there are thousands of little imps, cacodemons, and Minotaurs concurrently heaving green balls of fire. My beloved old 486 lurched through the same chore so haltingly that I periodically missed shots while the machine caught up with itself, resulting in my death. I don't miss that.

Did I mention it can also defrag a onegig hard drive in a little over an hour? I don't even want to tell you what that incredibly boring chore used to take.

That's just a partial list, of course. And that's fine, I suppose. But there are, on the other hand, a whole bunch of

things my stupid Pentium cannot do:

It cannot divide a nine-digit integer by another one down to 16 decimal points or some damn thing like that.

It can't run Windows 95, because it hasn't been invented vet.

It can't calculate the effect a 0.03 rise in interest rates will have on the bond market three years out with the kind of certitude the gamblers in the market have come to expect, I guess. It's the brokers and real estate scientists who seem the most upset about this issue, anyhow.

It won't write this column for me. No matter which upgrade to Word I use, I still have to input my own text, although I hear the folks in Redmond are working hard on that. I wish them luck, believe me.

Oh . . . and it can't stand up to the PR department at IBM, or the righteous sword of The New York Times.

That's why I'm looking forward to getting my new to make myself Pentium chip that will right all wrongs, giving me a brand feel BETTER while new computer without that annoying glitch, one capable of doing all the things that it can't do today. They tell me **REQUISITE 27,000** the new flawless processor is easy to install, and of course I've put chips into my motherboard several times. You *@\$%! Pentium just gently remove the old one (without damaging it, chip to fail. I'm because it has to go back to Intel). Then you take the heart and guts of your future computer and gently press it only 26,999 and into the old socket without twisting, folding, or messing up one single prong, because if you do, you won't have a

Pentium anymore. You'll have a footstool. Sure it's a little bit scary. But don't worry. I'm sure you'll get it dead, solid perfect—unless this is one of those times

that come up once every 27,000 years or so when you don't.

And it's got to be done, right? Right?

iewSonic has become synonymous with providing superior high performance color monitors to a demanding industry. As a recognized price/performance leader, we are committed to designing outstanding monitors that continue to win awards. In fact, here are some comments from a few editors:



"Some folks crave performance. Some look for price. And then there are those who want it all. If you belong to the third crowd, the ViewSonic 17 is the monitor for 10u." - PC World; April 1994



"Best color quality, best sharpness and best versatility - what more could we ask of the ViewSonic 17?

Frankly, we were surprised that one monitor could do it all."

- PC Computing; January 1994



"ViewSonic has one of the sharpest, most detailed and well-focused displays around."

- Windows; September 1994

Our new ViewSonic 17 monitor is loaded with features including OnView™ controls (on-screen menu to adjust screen images to your liking), ViewMatch™ (matches screen colors to printer output), ARAG® coating (virtually eliminates screen glare and reflection), and refresh rates up to 160Hz. No wonder this 17" monitor (15.7" diagonal viewable area) keeps on winning awards, generation ... after ... generation!



nd Hear.



With an eye and ear towards the future,
ViewSonic is expanding into the world of multimedia — with our new *PerfectSound*™



Model VS127 speakers. These amplified, magnetically shielded speakers are designed to be attached to the monitor or stand alone. In fact, when attached to our monitor they blend in so well they appear to be built-in. And they utilize state-of-the-art wave guide technology combined with a bass enhancing super woofer. These speakers pump out high fidelity sound with such power and clarity that you'll find it hard to believe you're listening to a compact 20 watt system. PerfectSound "speakers offer advanced audio technology combined with an ergonomic, space saving design — each speaker is only 2.4" widel Controls include bass, trable and master volume.

Sounds so vibrant and realistic, you'll swear you're sitting in front of an orchestra – not your computer!

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■ The Butterfly by IBM: A Notebook in a Subnotebook

The Future of Portables **Unfolds**

Ever since we watched George letson fold his car into a briefcase, we've wanted to do the same with our portable hardware. Now comes IBM's extraordinary Butterfly to perform this uncanny magic: It's little when you carry it, big when you put it to work.

Officially dubbed the Think-Pad 701C (although we prefer its more vivid code name, Butterfly), Big Blue's long-awaited subnotebook pioneers more technologies than any other portable since NEC ushered in the era of subnotebook computing more than five years ago with its 4-pound V20-class Ultralite. Although the Butterfly wasn't shipping at press time, IBM expects to make units available by April.

So where does the Butterfly's innovation reveal itself most? In usability: At long last you can buy a 4.2-pound PC that compromises nothing-that's right, nothing-in keyboard or display, At 7.8 by 9.6 by 1.6 inches, the Butterfly is smaller and lighter than Toshiba's Portégé T3600CT or Apple's Power-Book Duo, which together account for 70 percent of all subnotebooks used by businesspeople today.

Since a full-sized notebook keyboard requires at least 11 inches of width, how does the Butterfly pack one into 9.6 inches? The keyboard expands, literally. It's cut in half diagonally along a jigsaw pattern. which allows an extra row of keys to form when the lid is closed. Raise the display and each half of the keyboard slides outward. The right side of the keyboard then slides downward into position. Almost an inch of keyboard overhangs the subnotebook's chassis on either side when the display is raised. Close the Butterfly's display, and the keyboard pivots back into its 9.6-inch form factor.

The Result? George Ictson would be envious. You get the same superb keyboard that has been the trademark of full-sized ThinkPad notebooks, No other subnotebook matches its features: full-sized Shift, Enter, Backspace, and Tab keys; 12 large function keys, complete with the same spacing between F4/F5 and F8/F9 that's found on the keyboard of your desktop PC: dual Ctrl and Alt keys: and generous cursor controls that drop well below the right Shift key, Say what you will, but IBM knows how to make a keyboard, and the Butterfly's is simply outstanding.

As well it should be, Businesses have been reluctant to add subnotebooks to their pool of portables mostly because of small displays and cramped keyboards, Independent usability studies from Compaq, Toshiba, and IBM show that shrinking a keyboard by more than 10 percent of its normal size renders it too awkward for touch typing. Yet even keyboards shrunk by only 10 percent-the industry standard for all leading subnotebooks on the market today-still prove too

OVERVIEW Watch the Keyboard Spread Its Wings

Little and Big: With its lid closed the Butterfly is smaller and lighter than Toshiba's artful Portégé T3600CT. The big surprise is the full-sized notebook keyboard that emerges when the Butterfly is opened. Its gorgeous 10.4inch color display is larger than most portable screens and a full 22 percent larger than the Portégé's.



Portégé T3600CT



Guide to the Ratings:

**** Fxcellent

**** Good

*** Acceptable

** Poor

* Unacceptable

NEAK PREVIEW · SNEAK PREVIEW · S

awkward. The Butterfly gives millions of people who had written off subnotebook PCs a compelling reason to reconsider the category.

The Better to See You So does its 10.4-inch activematrix color display (a dualscan passive-matrix version, the ThinkPad 701CS, is also available). It renders more than 65,000 hues at 640 by 480 resolution. By comparison, the Portégé T3600CT comes with a puny 8.5-inch display. While we applaud the screen's bountiful real estate-yes, good enough for presentations before audiences of up to seven people-there's no SVGA adapter on the Butterfly except through the optional MultiPort II port

replicator. Ditto for

the external keyboard and serial ports.

There's no serial port on the machine itself? Relax: there's no. need for one. In addition to the two Type II side-mounted PC Card slots, the Butterfly comes with a 14.4Kbps DSP-based fax modem and infrared port.

The fax-modem DSP doubles as a 16-bit Sound Blastercompatible sound chip. There are also headphone, audio-in, and audio-out jacks, a fairly good speaker, and a screenmounted microphone. Presentations aside, the Butterfly's

sound capability lets it stand in as telephone/speakerphone and an answering machine. While not everyone will need such sophisticated features, the capabilities are there

should you need them. The rear-mounted infrared port conforms to the IRDA specification, which lets the Butterfly exchange files with Hewlett-Packard portables and desktops (at 115Kbps), Sharp handhelds (at 0.5Kbps), and the growing panoply of systems and PDAs that use infrared. Puma Technologies' TransXit is bundled with the Butterfly, providing file synchronization and one-way file transfers with any IRDA-compatible device.

In the rush for such splashy

ThinkPad 701C

USABILITY: Full-sized keyboard and display. balf-sized PC. ****

PERFORMANCE: Average for a 50MHz 486DX2, now where's our 100MHz DX4 version? ****

TECHNOLOGY: Open it and watch the keyboard spread its wings, ****

VERDICT: No other portable comes close, * * * * *

FILEBOX

ThinkPad 701C

Competition: Toshiba's Portégé T3600CT, Apple's PowerBook Duo.

Configuration (as tested): 50MHz 486DX2, 4MB of RAM, 510MB hard drive.

Options: RAM expandable to 20MB: 270MB to 510MB hard drive

\$4,000 to \$6,000 est, street price (800) 772-2227 Reader Service No. 621

ThinkPad 701C



Portégé T3600CT



Watch It Grow: Raise the display on the Butterfly, and the two halves of the keyboard spread apart. Then the right half drops into place to reveal a generous full-sized notebook keyboard, a luxury no other sub-fivepound portable provides.

Little Like a Sub. Big Like a Notebook

technologies, IBM didn't overlook the basics. The Butterfly we tested came with a 50MHz 486DX2, though Big Blue has already announced a 75MHz DX4 version. By our reckoning, a 100MHz DX4 can't be far behind. Accelerated video runs on a 32-bit VESA local bus. Performance overall was average for a 50MHz DX2.

The model we tested came with a stingy 4MB of RAM, expandable to 20MB. Drive options range from 270MB to

510MB, and the hard drive is removable. In addition, an ultrathin external floppy drive plugs in to the machine's Enhanced parallel port (an adapter for connecting a standard parallel device is included).

The perfect portable? No. Battery life was about 2.5 hours in our tests with power management features set at half mast. We'd love to see the Butterfly adopt lithium ion technology in the upgrade. We'd also like to see the video port migrate to the machine itself.

Sales of subnotebooks have sputtered and stalled despite some excellent offerings from Compag, Toshiba, Hewlett-Packard, and IBM. The Butterfly eliminates key obstacles that have kept customers skittish. Rarely does the arrival of a single product transform a maturing category wholesale. Such is the Butterfly's good fortune. This is the subnotebook to covet; nothing else comes close. MARTY JEROME

Guide to the Ratings

In each applicable area—usability performance, technology, and verdicta product is awarded from one to five stars. In some cases, other factors (such

as price) also affect a product's verdict. *** * Excellent A market leader that offers exceptional performance

*** Good Excels in a few areas; a good buy, though not perfect. * * * Acceptable Average for its class:

* * Poor Out-of-date or substandard, possibly offset by some positive features. * Unacceptable Missing processary features or suffering from subpar

GUIDED TOUR

IBM'S BUTTERFLY, INSIDE AND OUT



Wired for Wireless: Thanks to a built-in infrared transceiver, the Butterfly can exchange files with a growing menagerie of IRDA-compatible devices, including PDAs and desktop PCs.



no serial port, a fax modem with Sound Blaster-compatible DSP and a full complement of jacks are built in. The DSP chip doubles as a speakerphone.



Two-Pronged Attack: No extra baggage here. The AC adapter is smaller than a bar of bath soap, and pop-out prongs eliminate the need for an additional power cord.



No-Compromise Keyboard: Besides a full-sized QWERTY layout (shown here at actual size), you get large Backspace, Enter, Shift, function, and cursor controls. All other subnotes compromise on some or all of these keys.

Guide to the Ratings:

Alexandre Patty had a rather distinctive approach to descending a staircase. Since he obviously preferred doing things the hard way, he probably wouldn't have been interested in faxing with Delrina Winfax PRO.



Given the choice between using an elevator or your head to go down a flight of stairs, you'd probably opt for the easier way, right? So if you're not already faxing with the award-winning WinFax" PRO 4.0 fax software, you should be. Because it is, quite simply, the easiest and most convenient way to send and receive faxes. By faxing with your PC, you'll save countless trips walking to the fax machine. And WinFax PRO makes sending a fax

from within any Windows application as easy as print-



ing a document. WinFax PRO is available alone or the Dubrina Communications Suite

Organizing sent and received faxes takes just a couple of mousedicks, and you can even schedule a fax transmission for a specific date and time in the future. So visit your local dealer today, or call 1-800-664-2782 to upgrade or to order WinFax PRO, the world's best-selling fax software. Anything less is sure to be a headache.

Year after year, Delrina WinFax PRO has won nearly every major industry award – for features like fax autoforwarding, remote retrieval and handy graphics tools, including one that lets you add your own signature. You also get dozens of ready-to-use cover pages, OCR, group faxing, drag-and-drop addressing, and you can even have a document faxed to some and e-mailed to others. No wonder PC/Computing recently said, "The best fax software just got a whole lot better." DELRINA

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LTE ELITE 4/40CX FEATURES:

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- PREINSTALLED MS-DOS* 6, MS-WINDOWS* 3,1, TARWO MICROSOFT VIDEO FOR WINDOWS (RUNTIME)





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Panasonic PFC KX-SP100

It Prints, Copies, Faxes, and Zooms

Nobody's desk has space to spare, especially when it's sitting in a small or home office. Yet almost everyone wants the convenience of a personal fax machine, a photocopier, and a printer right at hand.

The Panasonic PFC KX-SP100 (better known to its friends as the Panasonic PFC, for printer/fax/copier) checks in at the same sub-\$800 street price as Hewlett-Packard's all-in-one OfficeIet (see "HP Turns a Business Triple Play,' December 1994, page 83). But by cramming its printing, faxing, and photocopying circuitry into a minitower configuration. the Panasonic PFC takes only a couple of square feet in desk real estate. Even better, its 300-dpi LED print engine churns out fast, clean printouts and plainpaper faxes you can't fault.

Snappy Printing The Panasonic PFC is also a strong performer, with speeds slightly faster than the Office Jet for text documents and nearly 50 percent faster for graphics-laden documents. The 10-sheet input tray, which sits upon the 70sheet paper tray, lets you fax or photocopy multiple pages by merely pressing a few frontpanel controls. To direct faxes, however, you have to plug in a telephone-unlike the Officelet, it has no dialing pad.

After living with the Panasonic PFC for a while, a few of its design details started to annoy us. For example, the sheet-feed photocopying mechanism doesn't handle newsprint or other low-grade paper very well. Clearing the paper jams that occur when you forget this often leaves behind tough-toextract remnants. Also, the

Three in One: Of the

photocopying in one

devices we've seen that

machine, only Hewlett-

enough in size and low

small or home office.

Packard's Office Jet and the

Panasonic PFC are compact

enough in price to fit into a

combine printing, faxing, and

OFFICE TOOL KIT

Fast, smudge-free printing in a small form factor

Ink-jet printing and huilt-in fax keynad

Panasonic PEC KX-SP100

USABILITY: Requires frequent paper refills and connection to phone for faxing, *** PERFORMANCE: Cranks at a fair pace compared to ink-

iet models. **** TECHNOLOGY: Toner-hased 300-dpi printer, plain-

paper fax, and sheet-feed photocopier all in one

space-saving box, ***

VERDICT: Three sound (and

High-Rise SOHO Tool:

Buy floor wax and get

dessert topping in the

PFC crams a 300-dpi

on desk real estate

notwithstanding).

bargain. The Panasonic

printer, fax machine, and

batch-mode photocopier into a minitower to save

(45-degree paper travs

affordable) office products

in the smallest conceivable footprint, ***

Hewlett-Packard OfficeJet

printer's paper feeder clangs as it takes up paper-not ideal for long printouts-and the papertray capacities are smaller than the OfficeIet's (though the Panasonic PFC's smudge-free, toner-based output is superior to the OfficeJet's).

Very Versatile If you can overlook these few inconveniences, the Panasonic PEC has a lot going for it. It performs some clever scaling: Incoming faxes transmitted at the standard 200-dpi resolution are automatically sharpened to an enhanced 300 dpi for better looks. And if you photocopy a legal-sized document or magazine clipping, it's

scaled down automatically to fit onto a letter-sized page. This scaling sometimes makes type look squat, but it remains legible nonetheless.

If space is a real problem in your office and you need fast printouts, the Panasonic PFC is the multifunction device you've been waiting for, Also, its output quality is slightly better (and more permanent) than the OfficeIet's ink-iet output. But if you're a frequent faxer, you'll be better off with the Officelet. The Panasonic PFC's lack of a built-in keypad forces you to fiddle with your phone each time you're ready to fax. MATTHEW LAKE

FILEBOX

Panasonic PFC KX-SP100

Print Features: PCL 4 emulation, 300-dpi LED printing, 70-sheet paper capacity, built-in handling for single envelopes, 2MB of RAM. Fax Features: Group 3 plain-paper fax, 18-page

Systems (800) 742-8086, (201) 348-7000

incoming memory.

Guide to the Ratings:

**** Excellent

**** Good

*** Acceptable

** Poor

* Unacceptable

VERDICT: Usability needs work, but great bang for the buck, * * * 1/2

Big and Bright: The keyboard on Gateway's Liberty is cramped, and its pointing device is oddly placed, but the 10.4-inch color display is roomier than those found on most full-sized 7-pound notebooks.

Breaking Away: The Liberty raced

ahead of MidWest Micro's 33MHz 486SX Elite SubNote. thanks to its 100MHz DX4 processor and 256K cache The Liberty's battery life

was less impressive.

Speedy Staying Power Windows Performance Battery Life (Hours:Minutes) 52% Faster CATEMAY 2000 LIBERTY Baseline NOTE: MINSTONE 55 REINS 15 OF THE MOST POPULAR WINDOWS BUSINESS APPLICATIONS. ZUGIT BATTERY MURBOWN TEST MICHANICAL IV SIMILIATS SEVESTRENOS

For the extra girth, though, the Liberty packs features that businesspeople have been reluctant to forgo, Among these; a 50MHz 486DX2 or 100MHz DX4 processor, a video accelerator on 32-bit local bus, 8MB of RAM (expandable to 20MB), a splendid 10.4-inch dual-scan passive-matrix color display capable of 256 colors at 640 by 480 resolution (and SVGA on an external monitor), and a 340MB removable hard drive (with 540MB and 720MB options).

CW! HARDWARE:

Face it: No one cares about the

stiff neck and sore shoulders

you get from schlepping around

a 10-pound notebook computer

all day. If your pleas for a sub-

notebook have fallen on deaf ears, Gateway 2000's Liberty may win you a new audience with those who clutch the com-

T3600CT, the Liberty strikes a

shrewd balance between heft

and functionality. At 8 by 10 by

1.6 inches and 4.2 pounds, it's

slightly wider and heavier than

traditional subnotebooks such as Compaq's Contura Aero (with AC adapter) and IBM's

ThinkPad 510CS-both splen-

did portables that have failed to

generate broad corporate sales.

pany purse strings. Like Toshiba's crafty Portégé

Gateway Lightens the Load

On the Wire Besides the standard set of serial, parallel, VGA, and keyboard/mouse ports, the Liberty features two PC Card Type II slots and two-way infrared capability. Designed according to specifications of the Infrared Data Association (IRDA)—which therefore makes the Liberty compatible with Sharp and Hewlett-Packard devices-the wireless link can exchange data at 115.2Kbps from a distance of up to 4 meters. Best of all, a serial infrared receptor for

Guide to the Ratings:

desktop PCs is also included. For a subnotebook, the Liberty's usability is a mixed bag. Fingers move nimbly over the OWERTY keys, which have 90 percent of the spacing that keys on traditional notebooks have. The tiny Backspace and Enter keys do little to slow your touch typing, and even though cursor controls are half-sized, they're situated well below the right Shift key-far less confusing than having the up-arrow key positioned to the right of the Shift key as it is on many subnotebooks.

Typing agility is helped immensely by a generous 3inch wrist rest and 1-inch rear legs that prop the machine up at a comfortable angle. Still, we have two complaints: The function keys are simply too small (moving the Pause and Print Screen keys to a desolate area of the keyboard would help), and the position of the EZ Point pointing device is awkward. While the Liberty's key-

board could take a few lessons from Toshiba's Portégé-or IBM's new ThinkPad 701C (see "The Future of Portables Unfolds," page 56)-its bang for the buck is alluring. Prices start at \$2,799 for a 50MHz DX2 with 8MB of RAM and a 340MB hard drive.

Take Note The Liberty nicely complements Gateway's ultralight HandBook 486 and its ColorBook notebook, And given its power, expandability, huge display, and light weight, the Liberty gives good reason to bypass 7-pound notebooks altogether. MARTY JEROME

FILEBOX

Liberty

Competition: Hewlett-Packard's OmniBook 600 and Toshiba's Portégé T3600CT compete in features, while MidWest Micro's Elite SubNote competes in price.

Features (as tested): 100MHz 486DX4, 8MB of RAM, 340MB hard drive. **Configuration Options:** 50MHz DX2 with 8MB of RAM and a 340MB hard drive (\$2,799), external floppy (\$79).

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Pick a Card, Any Card

PC Cards are for portables, right? Not anymore. Portables need easy expansion in a small frame, and that's exactly what PC Card peripherals deliver. But imagine having that same easy expansion from a drive bay on your desktop PC.

If your data requires tight

Ir your data requires organsecurity, you cause a PCCard hard drive and lock it in a site. Or you can take hundreds of megabyres of data with you on the road. Better yet, instead of buying separate high-speed fax modens or network cards for your desktop and your portable, you can buy one add-in card that services both. Two commanies. Databook

and SCM Microsystems, are betting that scenarios like these will make PC Cards a desktop hit Databook's ThinCardo-Drive and SCM's Swapbox Classic Combo each occupy one 3.5-inch drive bay and ship with a kit that includes all the hardware and software you need to get started.

The Skinny Databook and SCM take different approaches with their drives. The Thin-CardDrive holds two Type II cards or one Type II card and one Type III card (typically a hard drive) at a time-perfect if you need access to two such devices at once. The SwapBox Classic Combo, by contrast, supplies a standard 3.5-inch floppy drive along with space for one PC Card that can be either Type II or III. If you're tight on drive bays, the Swap-Box Classic Combo is the solution for you.

Installing one of these drives is akin to adding an internal floppy drive to your system: slide it into an open drive bay and connect to a standard 16-by ISA host eard. SCM and Databook are leaders in providing



(left) and Databook's ThinCardDrive (right) both let you easily share PC Card peripherals such as modems, SCSI controllers, network cards, hard drives, and RAM cards between portable and desktop PCs.

PICKS EASY DESKTOP EXPANSION

Access to two PC Card peripherals at once

Databook ThinCardDrive

PC Card and floppy in one drive bay

SwapBox Classic Combo

card and socket services to notebook makers, but setting up their software wasn't easy. Slow Start Memory con-

fliets presented the biggest installation headaches. To get the drives up and running, we had to manually exclude sections of upper memory for the requisite software drivers—not a flu way to spend your affection. Most of the drivers loaded high, but when we ran out of space in upper memory, the ThinCardDrive snatched 50K of conventional RAM, while the SwapBox Classic Combo nabbed just 31K.

Once the memory conflicts.

were resolved, however, putting the drives to work was a Play compatibility, we tried the drives with a number of PC Card peripherals, including Maxtor's MobileMax 105MB hard drive and the TDK DF 14.14 fax modem. The drives recognized them all. The Thin-CardDrive and SwapBox Classic Combo make installing a new hard drive, fax modem, or new and drive, fax modem, or network card as easy as inserting a floppy disk.

breeze. To test for Plug and

If you have only one drive bay to spare on your system and want PC Card expansion, the ThinCardDrive is your drive. For access to two PC Card peripherals at a time, however, the SwapBox Classic Combo is our pick.

ADAM MEYERSON

ThinCardDrive

USABILITY: Installation is tricky, but after that it's just Plug and Play. ***

TECHNOLOGY: Holds two
Type II or one Type II and
one Type III cards. ****
VERDICT: An inexpensive

VERDICT: An inexpensive
way to shuttle several PC
Cards between portable
and desktop PCs. * * * *

SwapBox Classic

USABILITY: Tough to install, but the Plug and Play is worth it. *** TECHNOLOGY: Holds a Type

II card and floppy drive; no Type III support. *** VERDICT: Easy PC Card expansion for systems with a single drive bay. ***

FILEBOX

ThinCardDrive

Competition: Cardwell's CardBay 20200-1, Greystone Peripherals' Card Dock GS-220. Capacity: Two Type II PC

Cards or one Type II and one Type III PC Cards.

Included: Drive, interface

card, cable, software.

Databook (716) 292-5720 Reader Service No. 62

SwapBox Classic Combo

Competition: Cardwell's CardBay 20200-1, Greystone Peripherals' Card Dock GS-220. Capacity: One PC Card.

which can be either Type II or Type III.

Included: Drive, interface card, cable, software.

SCM Microsystems (408) 370-4888 Reader Service No. 625

Cheapest Laser Money Can Buy

Laser printers just don't get any cheaper than the Brother HL-630. Rather than plopping down \$400 for an ink-jet printer and hoping your associates will he fooled by the "almost laserlike" quality of its output, you can spend the same amount for the real thing.

The Brother HL-630 gives laser printing a whole new meaning with its ridiculously low price. Even better, it doesn't force you to make sacrifices. With sharp text output and a 6-page-per-minute (ppm) engine, it's tough to go wrong.

Bits and Pieces The Brother HL-630 is your basic no-frills printer. However, we found setup to be a bit tricky, requiring separate installation of the drum and toner cartridge. And the instructions for this were short on explanation and long on unclear illustrations.

Driver installation, on the other hand, required little effort, and we had it printing in no time. Oriented toward SOHO users, the drivers for the Brother HL-630 are fairly user-friendly, though we'd like to see more graphics and less text in the setup dialog box. Also, an online guide or tutorial similar to Canon's Visual Guide or Hewlett-Packard's Explorer would be a nice touch. Another thing missing on the Brother HL-630 is an on/off switch. Not to worry, though, because this printer is Energy Star compliant and powers down when not in use. You can configure the printer to "sleep" when you haven't used it for anywhere from 1 to 99 minutes. Of course, this causes some minor delays as you wait for the printer to power up after being idle, but that's a small price to pay for



Luxuries of Laser: The Brother HI -630 features 300dpi output, a 6-page-per-minute engine, and a small footprint that should rest nicely on any desk. At only \$399 on the street, it's an excellent personal printer.

Dark Star While text output on the Brother HL-630 will easily serve your everyday needs, graphics tend to be a little dark. This creates less definition within images (even clip art) and makes for unimpressive gradients.



a laser printer. But soo won't dream of printing most important docume

Hewlett-Packard's Laser let 4P than the Brother HL-630).

you'll be quite pleased with the Brother HL-630. It ships with 21 resident bit-mapped fonts and 24 TrueType-compatible scalable fonts. Text output is crisp and distinct-much better than even the best ink-iet printer-and should serve you well for printing reports and text-laden documents.

If you print mostly text,

Graphics output is adequate, provided your needs don't extend beyond the occasional piece of clip art. The images it produces are on the dark side, which creates a loss of contrast in gradients and shading. And the graphics aren't nearly as smooth as a 600-dpi printer like (which costs about \$800 more

Swift Speeds While the Brother HL-630 won't win any awards for speed, it's a snappy performer compared to other printers in its price range. It's significantly faster than any ink jet we've tested, and the 6ppm engine churns out pages at an acceptable clip. Most lasers that come close to this price have 4-ppm engines, so in the long run, this printer's raw engine speed puts it ahead

of other low-cost lasers. The Brother HL-630 ships with 512K of memory-not much if you're printing lots of USABILITY: User-friendly drivers, though setup was somewhat tricky, *** PERFORMANCE: Ouick speeds, even for graphics tresentations. **** TECHNOLOGY: Your basic

6-ppm, 300-dpi black-andwhite laser. *** VERDICT: The lowest-priced laser trinter money can hev. * * *

FILEBOX

Brother HL-630 Competition: Hewlett-

Packard's Laserlet 4P. Features: PCL4, 300-dpi (upgradable to 2MB).

Resolution: 300 by 300 dots per inch.

Cost per Page: Approximately 2.5 cents. including paper and toner, assuming 5 percent coverage.

Engine Speed: 6 pages ner minute

Font Sunnort: 21 resident bit-mapped fonts, 24 TrueType fonts.

Reader Service No. 626

high-resolution graphics. You can upgrade the memory to 2MB, but even that's not suited for heavy graphics. The printer also ships with a multipurpose paper tray that supports varying paper stocks and envelopes.

If you're in search of an inexpensive, no-nonsense laser printer, the Brother HL-630 fits the bill. You can't beat its price, and the speed and output quality are sufficient for most tasks. But if you're planning on graphics-oriented printing or require high standards for graphics output, your money may be better spent on a 600dpi printer such as the Laser-Jet 4P. KYLA K. CARLSON

Decorate Your Documents

The longer you wait to buy a color ink-jet printer, the tougher your choice will be. Why? Because the best-selling Canon BIC-600 just got better.

On the surface, the Canon BJC-600e looks just like the Bubblelet printer we've grown to know and love It still sports a petic design that saves precious desktop real estate. But now it has a lower price, enhanced print speeds, and easy-to-use software. In addition, Canon has improved output quality by upping the black resolution to 720 by 360 dpi and the color resolution to 360 by 360 dpi.

The Color Advisor software is another new addition. Select this option and the software will automatically add to or enhance the colors of your documents following guide-lines that you help establish. For example, if you want to



Canon's
Compromise:
The Canon BJC600e is fast and
inexpensive, but
the trade-off is
mediocre text
output. Color
prints, on the
other hand, are
vibrant and clean.

print your volunteer organization's newsletter, you can select the audience, style, occasion, and setting, then the software will add colors accordingly. While this is an entertaining feature, we wouldn't use it when color really counts.

Despite its many enhancements, we have to give the output of the Canon BJC-600e mixed reviews. The colors look great—vibrant and clean—but the text is pale and not nearly as crisp as that of its sibling, the Canon BIC-4000.

The Canon BJC-600e isn't the cheapest portable printer out there, but its diminutive size, good speed, and vibrant color output keep it in the running.

KYLA K. CARLSON

USABILITY: Color Advisor software is a nice idea, but will you ever use it? *** PERFORMANCE: Prints at a

decent clip. ****
TECHNOLOGY: Text output is
dark, but it doesn't measure
up to the rich blacks of the
DeskIet 560C. ***

DeskJet 560C. ***

VERDICT: Low price, adequate
output, good speeds. * * *

FILEBOX

Canon BJC-600e

Competition: Hewlett-Packard's Desklet 560C

has sharper output and faster speeds, but it carries a price tag that's about \$200 higher. Cost per Page: Approximately 2.5 cents

Approximately 2.5 cents for black-and-white printing and 12 cents for color printing.

Canon Computer Systems (800) 848-4123 Reader Service No. 627

SuperQuad 4X AT CD-ROM vs. MultiSpin 4Xe

Quad-Speed CDs: Four Times the Fun

In the relentless drive toward faster peripherals, you already know that you need a quad-speed CD-ROM drive: Prices are dropping, and applications that require 600Kbps transfer are coming. Teac's SuperQuad 4X AT CD-ROM and NEC's MultiSpin 4Xe are object lessons in how to buy a quad-speed CD-ROM drive. These drives are widely diffused to the control of the control

ferent in price—the Super Quad 4X costs less than \$300, while the MultiSpin 4Xe is more than \$400. Also, the Super Quad 4X is a caddyless solution with minimal controls, while the MultiSpin 4Xe uses caddies but sports an LED status screen and MultiSpin Does All the Work



Drag Race: The SuperQuad 4X AT uses a sound card's interface, which strains performance.

CD audio controls up front. And finally, the SuperQuad 4X piggybacks off a sound card's Panasonic-compatible CD-ROM connector (or uses a \$15 stand-alone interface), while the MultiSpin 4Xe uses a 16-bit SCSI controller.

Performance differences are just as pronounced. The SuperQuad 4X managed to get beyond dual-speed transfer rates, but dragged so heavily on the CPU that it couldn't decompress video files coming across the interface. The Multi-Spin 4Xe external drive glided through our tests.

The SuperQuad 4X is priced only slightly higher than a dual-speed drive. But the MultiSpin 4Xe costs \$100 less than its quad-speed cousin, the MultiSpin 4XPro, and performs better. MATHEW LAKE

SuperQuad 4X AT VERDICT: Price is the only

reason to buy it. * *

MultiSpin 4Xe

VERDICT: A highly evolved quad-speed drive. * * *

FILEBOX

SuperQuad 4X AT CD-ROM \$285 est, street price for internal

model (\$15 for interface card) Teac USA (800) 888-4923 Reader Service No. 628

MultiSpin 4Xe

S415 est, street price for internal model, S515 for external (\$80 for interface kit) NEC Technologies (800) 388-8888 Reader Service No. 629

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with an eye-pleasing view of documents. ****

TECHNOLOGY: Several key innovations, but not as chummy with Windows

apps as it could be. *** VERDICT: A capable document manager that's short on integration but long on visualization * * * *

PageKeeper 2.0

USABILITY: Big. clear buttons and many ease-of-use

TECHNOLOGY: Impressive retrieval features are now better integrated and tackle

VERDICT: The best value in electronic cabinetmaking extends its reach inward

shortcuts ****

online info ****

and outspard. ****

Visual Recall vs. PageKeeper 2.0

Filing Cabinets of the Future

Document management is as much an art as it is a science. which makes comparing two document-sifting programs a bit like comparing a photograph and a painting-they can show the same thing in very different ways, XSoft's new Visual Recall and Caere's undated PageKeeper 2.0, a pair of capable but contrasting document managers, are no exception.

Visual Recall is a more graphical take on managing documents across a network. Designed for use on NetWare LANs, it typically taps into electronic documents stored on a network server, though you can have it comb through files on local drives as well. And because it comes bundled with a copy of Xerox's TextBridge optical character recognition (OCR) program, it also can convert hard copy into electronic files with the help of a scanner.

Novel Perspective Visual Recall separates the searching process from the retrieved results and makes assembling simple or complex Boolean searches a point-and-click procedure. Its search engine has what XSoft calls "linguistic comprehension," so it can do multilingual searches and find the derivations of keywordsfor example, a search for the word mice will also find mouse.

Visual Recall's Tree and Grid views let you visually browse through sets of documents to better understand their relationships. The Tree view offers a flowchart-style look, while the Grid view supplies a kind of 3-D time line. There's also a conventional list

For a new perspective on documents, try Visual Recall's 3-D time line It shows when files were created and aroups them by file type

Picture This:



The Naming of Cats is a diffic It isn't just one of your he You may think at first I'm as r When I tell you, a cat must have First of all, there's the name th Such as Peter, Augustus,

view, and a browser for viewing text and graphics files. Although Visual Recall can't be integrated into other applications, this feature is reportedly coming in Version 2.0.

documents.

Inside Look PageKeeper 2.0, on the other hand, can be integrated into your applications-and into your communications stream as well. A new feature called PKDirect lets you add PageKeeper options to the Control or File menus of many applications.

The new version of Page-Keeper also helps you navigate the information superhighway. It has special import features for files downloaded from America Online, CompuServe,

and other major online services. PageKeeper includes OCR functions based on Caere's OmniPage program, and a powerful search engine that automatically indexes the full text of documents and recognizes similarities by spotting root words. There's also Page-Keeper's hallmark, a prioritizing feature called Weighted Relevance Retrieval: Word searches produce a color-coded and startlingly accurate ranking of relevant documents.

However, there's nothing unearthly about PageKeeper's price. At less than \$100 on the street, it's one of the best bargains in document manage-CHRIS O'MALLEY

FILEBOX

Visual Recall

System Requirements: Windows 3.1 or later. 4MB of RAM (16MB recommended).

Unique Features: Graphic visualization of search results, linguistic comprehension.

OCR Included: TextBridge.

(800) 428-2995

Reader Service No. 610 PageKeeper 2.0

System Requirements: Windows 3.1 or later. 8MB of RAM (12MB recommended)

Unique Features:

Weighted relevance of search results, import capabilities for file downloads.

OCR Included: OmniPage.

Reader Service No. 631

On Time and under Budget

SNEAK PREVIEW Do your projects always seem to require more people, money, and

time than you have at your disposal? Primavera's SureTrak Project Manager for Windows can help you keep your largeand small-scale project plans on time and under budget.

Although Primavera advertises SureTrak as the low-end counterpart to its Project Planner, the only low-end thing about SureTrak is its \$499 street price. It doesn't include Project Planner's ReportSmith (which lets you design report templates that query users for input), but in most other ways SureTrack is as full-featured as its \$4,000 cousin. You can define an unlimited number of activity-related calendars for overtime calculations on a taskby-task basis and develop resource-related calendars that track costs and schedules. Sure-Trak can even track percent complete and remaining duration as separate items instead of a single, averaged figure.

Low Rent, High Yield More surprising are SureTrak's ease-of-use innovations. You can drag and drop individual tasks in the Activities column and customize their order instead of accepting the various defaults. SureTrak also provides a Summarizing icon for easy viewing that lets you condense and expand related userdefined activities, along with their dates, costs, and durations. The context-sensitive help isn't a match for Microsoft Project's hand-holding Planning Wizard, but its how-to procedures, concept discussions, diagrams, and embedded explanations make it possible to get intelligible information

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EC - Ela	ine Curtis, Creative Director						
C400	Write and design storyboard	I	phosed				
C410	Dasign graphics stills		graphics etile Design graphics animation				
C420	Design graphics animation						
E400	Reviee storyboard		etoryboats	1			
9410	Produce graphics stills	_	- September 1		-		
042D	Produce graphics animation	-		A		PI	
9430	Edit visuale	-				4-	_
0440	Finalize video maeter		R L				
GP - Gr	anada Products Inc.		1				
A400	Clent approval of storyboard		approval o	f etoryboar	d		
AS-AU	dio System						
TW - Th	omas Warren, Sound Engineer		1				
C100	Record voice marter	1	The same				_
C110	Select music		ect music				

Project Management, Your Way: Looking to tame the savage project? Primavera's SureTrak Project Manager for Windows can help. Every SureTrak element is reconfigurable, from the available menu selections to the status bar at the bottom of the screen. And SureTrak lets you simplify display elements for new team members and retain the rich assortment of features for activity leaders.

Tools You Can Use: With a smart nod toward usability, SureTrak includes a customizable toolbar. Hereyou can add commonly used Windows commands as well as SureTrak-specific shortcuts like Spotlight, which highlights and tracks progress on selected activities—handy for large projects and a must at higher video resolutions.

TECHNOLOGY: Fine data
tracking capabilities and
ODBC support. * * * * *
UNDEC support. * * * * *

A Puil down the Reports menu for access to dealied project reports and install projects from any level or perspective. From stepy-tap resource when the bod Gantt chart views.

C Revoration is a breze in

C. Navigating is a breeze in SureTrak, as is keeping your place. The Dat-o-Meter's date matches the location of your mouse over a Gantt chart.

USABILITY: Extremely

configurable, but online help lacks hand-holding for novices. * * * *



SureTrak's strongest competition comes from Scitor's \$420 Project Scheduler 6 for Windows, Version 1.5 (see "Project Juggling Made Easy," January, page 102). In most respects, the two stack up evenly.

Quick Reports Project Scheduler and SureTrak both let you analyze data from different hienarchical perspectives. Both products also include support for the Open Database Connectivity (ODBC) application program interface, which makes it easy to exchange project data with other ODBCcompatible applications such as relational databases, spreadsheets, and other information resource managers. The honors for quick andcustomizable report generation split almost down the middle between these two project managers. Project Scheduler supplies 30 preconfigured reports online, as opposed to SureTrak's 20. But SureTrak lets you adjust all project elements—page breaks, graphics placement, timescale density, and so on—from inside the Print Preview made.

Although the two programs are closely matched in features and price, in the end we'll take SureTrak Project Manager over Project Scheduler. Its approachable interface and easy upgrade path to Project Planner give it the edge. BARRY BRENESAL

FILEBOX

SureTrak Project Manager

Competition: Scitor's Project Scheduler 6 for Windows, Version 1.5, Microsoft Project 4.0, and CA-SuperProject 3.0, but SureTrak's interface is more approachable.

Minimum System
Requirements: 386 CPU,
Windows 3.1, 4MB of
RAM, 11 MB of free

hard-disk space. \$499 est. street price Primavera Systems (801) 973-1300

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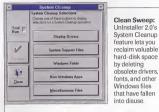
Spring Cleaning for Your Hard Drive

Windows programs are such thoughtless guests. Invite them to your hard drive, and they scatter bits and pieces of themselves like digital droppings in all sorts of directories. They often don't tell you what they're doing, much less ask permission. The result is that when an application has worn out its welcome and you toss most of it out of Windows. various DLLs, drivers, and WIN.INI lines maintain lives of their own. This clutters your directories, takes up valuable disk space, and makes Windows slower to load.

MicroHelp's UnInstaller 2.0 has traveled the road to the best-seller list on the promise of completely deleting Windows programs and all their related fragments. Vertisoft's Remove-It makes the same promise. However, these programs have different features that give them each an edge for separate tasks. What they have in common is that they err on the side of restraint if there's any question about whether other applications may use the files about to be deleted. And that's as it should be.

Safety First Any program that deletes files should not be too easy to use. Until software becomes omiscient, the smart programs will realize their limitations and pass off any tricky question to you. Both Unlinstaller and Remove-It do exactly that. The result is that deleting complex applications isn't effordless, but it's safer and still a lot easier than zapping on your own.

The programs both attack unwanted files on several fronts. First, they try to identify all files used by applications in your Windows group and tell you if the files are being used by other



Remove-It's feature for zapping fonts shows which fonts appear to be inactive and what each font

Control Control
Vanish Control
Vanis

applications. They also try to identify relevant sections in WINLNI and their Program Manager icons. A viewer then lets you look at a file's header information, which can help you determine whether or not it should get the ax. Both programs make you confirm your decision several times, and as an added precaution you can back up the files to be deleted in a compressed archive.

Picking up Strays UnInstaller and Remove-It also look for files left behind after a manual deletion of an application, but forget about using this feature. In our tests, both programs identified as orphans files that were essential to programs like WordPerfect and Excel. UnInstaller even identified its own DLLs as orphan.

In their primary function, which is ridding your drive of applications and any of their traces, the programs performed similarly—that is, inexactly. While uninstalling Word for Windows, both overlooked related files that Word stuffs into subdirectories.

Because of its handling of INI files, Uninstaller is the better choice for cleaning up a drive that's had a lot of programs crammed onto it over time. But Remove-It has a special feature for the long runt Log-It is a Windows program that keeps records on all the files you install and any changes made to WIN.INI. With these records it can then perform a precise deletion of any application installed on your system.

UnInstaller and Remove-It are useful provided that you remember their limitations. But the Log-It feature in Remove-It means that this is one program we won't delete from our PCs. RON WHITE

Uninstaller 2.0

USABILITY: Carefully steps you through the tricky process of deleting outdated support files. ****

TECHNOLOGY: Not

omniscient, but the INI
editor is top-notch.***
VERDICT: Useful for clearing
a drive that's seen months
or years of software
installations.***

Remove-It

USABILITY: A useful interface that lets you keep a close eye on exactly what

you're doing. ****
TECHNOLOGY: The Log-It
utility should have been part

of Windows all along. ****
VERDICT: A better choice for
the long run. Get it and put
Log-It in your Startup
group. ****

FILEBOX

Uninstaller 2.0

System Requirements: Windows 3.1 or later, 4MB of RAM, 3MB of disk space.

Best Features: Good tools for editing INI files, a generous help system that tells you why to do something as well as

how to do it.

\$45 est. street price
MicroHelp
(800) 922-3383, (404) 516-0899
Reader Service No. 633

Remove-It

System Requirements: DOS 4 or later, Windows 3.1 or later, 386 CPU or higher, 2MB of RAM, 2MB of disk space.

Best Features: Capability to keep a log of file usage and record of changes an installation makes; good interface.

539 est, street price Vertisoft Systems (800) 466-5875, (415) 956-5999 Reader Service No. 634

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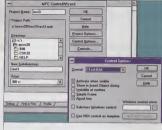
From C++ to Shining C++

Anyone who says that developing applications in C++ is difficult is lying-or hasn't used Microsoft's Visual C++ 2.0. From its elegant integrated development environment right down to its cute little wizards. Visual C++ 2.0 is the answer to every developer's cry for more power and less confusion.

Good-bye Lines The hardest part about programming Windows is writing the lines and lines (and lines) of code necessary to draw windows, place menus, create toolbars, and so on. Thanks to Visual C++'s AppWizard, you don't have to know very much about that stuff. With just a few mouse clicks, you can create a skeleton on which you hang the code you're really interested in the code that handles your data.

But don't expect to be able to click your way through the AppWizard to a useful application. If you simply compile and run the skeleton it generates, you'll get a nice white screen with a toolbar and some standard menus. With additional clicks, however, you can also add multiple document interface (MDI) support, OLE 2.0 support, and the power to access a number of databases. If you want to distribute your freshly designed application internationally, the AppWizard will take care of that as well: Shipping with Visual C++ are three languages (German, French, and English). All you have to do is add a few more lines of code on top of that, and violà, you have a working application.

What's it like to add those last few lines of code, you ask? In a word, elegant. Visual C++'s integrated development environment (IDE) is one of the best we've seen. It includes



Seeing Is Believing: Visual C++'s online help is superb. You still have to be comfortable with structured programming concepts and object-oriented code to produce professional-looking applications, but Visual C++ goes a long way to making it as painless as possible.

USABILITY: Makes C++ nearly as easy as Basic, **** PERFORMANCE: Decent compile and link performance, creates efficient EXEs. *** TECHNOLOGY: Generates efficient code auickly and painlessly. **** VERDICT: The best C++ programming tool we've

used ***

The Wiz: Visual C++ 2.0 introduces the ControlWizard, a tool for quickly changing the attributes of controls (for example, buttons and menus) using the Microsoft Foundation Classes 3.0. It sure heats doing the work by hand.

Pixel Formats A pitral formal specifies several pe surface. Some of the properties sp

all the extras we've come to expect, like context-sensitive colorization of keywords and drag-and-drop editing. But beneath that veneer lies awesome power. Our favorite feature was the capability to go to procedure and variable definitions and their references by right-clicking on them. That kind of bonus can save a programmer hours-particularly one who is new to a project.

Another productivity boost is in compile times. While Visual C++ isn't the fastest compiler we've seen (Symantec C++ under Windows 3.1 compiled our test applications faster), it's certainly no slouch.

16 Bits or 32? Microsoft doesn't have one compiler that targets both Win32 and Win16 applications. Instead, the CD-ROM that contains Visual C++ 2.0 (the 32-bit targeting

compiler) also contains Visual C++ 1.5 (the 16-bit targeting compiler). Alternately, you can use Visual C++ to generate a Win32s application, which runs under Windows 3.1 (provided you've installed Win32s support) through a process called thunking. If you have existing Win16 applications you want to bring into the 32bit universe, Microsoft supplies the PortTool with Visual C++. This simple utility searches

possible changes. Visual C++ 2.0 is programming the way it was meant to be: fast, efficient, and powerful. If you've found that Visual Basic isn't up to the challenge. Visual C++ is definitely the next compiler you should con-

JOHN MONTGOMERY

your source code for possible

incompatibilities, brings them

to your attention, and suggests

FILEBOX

Visual C++ 2.0

Competition: Borland C++ and Symantec C++, but Microsoft's version leads in performance and usability.

System Requirements: 16MB of RAM 110MB of hard-disk space (full installation) 33MHz 486 or better recommended.

Learning Curve: Requires a working

knowledge of C++ (or at least C): familiarity with object-oriented programming techniques recommended

(800) 426-9400, (206) 882-8080 Reader Service No. 635

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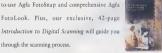
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Painting for Artists and Aesthetes Alike

PREVIEW what you're doing."

"Painter 3 lets you have a lot of fun on a PC, even if you don't know

"No way, Painter 3 is a serious, complex tool designed for professional artists."

Hold on, you two. You're both right, Fractal Design Painter 3 is an enticing tool for amateur computer artists and a terrific creative tool for design professionals.

As with previous versions, Painter 3 electronically simulates the effects an artist would get using natural media such as brushes and paint to create images. And like Micrografx Picture Publisher, Adobe Photoshop, and other image editors, Painter lets you touch up digital photographs or apply special effects to your images.

Easy Animation New to this version and unique among image editing packages is Painter's features for creating and editing animation (including QuickTime and Video for Windows files). Building on traditional animation techniques. Painter simulates the "onion-skin" method that uses thin sheets of paper so the artist can see through to the previous frame and trace parts of it as the basis for the new frame. But unless you're an experi-

enced animator, you'll find even tracing images is a chore. Fortunately, Painter extends these animation capabilities so that amateurs can add colors, borders, objects, textures, and other effects to pre-existing animations to create, say, an oil-painted cartoon.

Painter also makes life easier by providing new tools such as the Image Hose, which answers the complaints of the artist who has to draw a scene that, for



Something for Everyone: Fractal Design Painter 3 features dozens of image editing effects that will keep the novice entertained and the professional productive. In a matter of minutes, a simple image can easily be transformed into a stunning work of art.

Special Effects: Painter provides infinite ways to customize its tools through icons and drop-down menus, shown here in the dialog boxes for selecting paper textures, colors, brushes, and other tools. USABILITY: Experimentation has never been more fun. but mastering the tools can be tricky, ***

TECHNOLOGY: Takes naturalmedia effects to a new level. ****

VERDICT: A godsend for professional artists and a useful special-effects graphics tool for digital dahblers ****

A. Spray repetitive designs such as these clover leaves onto an image with the Image Hose, A library of images is included on CD-ROM.

B. Painter ships with a host of new special effects that you can use to distort images. C. The gradient tool lets you create a

wide variety of custom fills.



example, contains hundreds of clover leaves. Instead of drawing each leaf, the artist can create a dozen or so representative clovers, then use the Image Hose to spray them onto the artwork. And if you're not enough of an artist to create the initial clover leaves, don't worry. You can sample parts from images already on your hard drive or use any of the hundreds of images supplied on the CD-ROM accompanying the program.

Work of Art Painter's new interface looks friendly and inviting to dabblers, but it can be difficult to master. Much of its complexity comes from an attempt to give you total freedom to control how the program works. For example, you can control the shape of individual hairs in an electronic brush. This gives you an infinite number of variations in everything from brushes to paper surfaces. Fortunately, you can save your personal favorites to use again and again, or you can select prerolled combinations from the CD. Painter's interface includes a

number of thoughtful touches to help you through its many layers of icons and text menus. One example is the way frequently used icons automatically move to toolbars and stay open while the other icons remain hidden. And you can tear off portions of a dialog box to keep just that part visible after

you close the box it came from. Despite these aids, getting the most out of Painter still takes some practice and experimentation. For the artist or aesthete willing to explore its intricacies, however, the results can be dazzling. RON WHITE

FILEBOX

Fractal Design Painter 3

Competition: Micrografx Picture Publisher and Adobe Photoshop, though Painter leads in natural-

media special effects. It also includes animation. Minimum System Requirements: 386 CPU.

8MB of RAM, 256-color SuperVGA: 486 or faster CPU, 16MB of memory, 24-bit graphics, and a pressure-sensitive tablet recommended

Also Included: CD library of images and effects

Fractal Design Reader Service No. 616

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That's why it won PC Computing's 1994 MVP award. The MGA Impression series combines the industry's fastest 64-bit VRAM rechnology with hardware accelerated Windows, video and 3D. And for only \$369!

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matrox

"(MGA Ultima Plus) is one of the fastest cards we have seen." PC Magazine, Best of \$4 Jan. 10, 1995, p. 142



"It's the MGA Impression Plus' combination of sophistication and down-to-earth street price that wins it our MVP Award this year." PC Computing, Dec. 1994, p. 140

An Easy Way to Tally Expenses

The worst part about business travel isn't the long lines for rental cars or the five-hour layover at O'Hare; it's filling out the detailed expense reports when you get back, right? Not if you're using Portable Software's QuickXpense, an easyto-use utility for preparing, filing, and tracking your corporate expense reports.

OuickXpense ships with 15 standard forms, and for an additional \$99 you can purchase XpenseForms to add exact templates for any corporate form to OuickXpense. (XpenseForms is free to Fortune 1,000 users and companies that buy three or more copies of QuickXpense.)

Entering receipts in Ouick-Xpense is easy because sorting is automatic and customizable.

Purpose	, E	Business Trip to San Jose, Costa Rica				
Date		3/25/95			Project	
	Expens	Туре		Description		
Date	City			Attendees		
3/14/95	Airfare			SFO to San Jose, CR		
3/14/95	Car Ren	tal				
	San Jos	0	4			

hassles out of expense reports; prepare them electronically with Portable Software's QuickXpense.

Context-sensitive entries are saved in smart lists, so you need only enter information once. You can also break down receipts easily into itemized entries (great for hotel statements) and link items to information in any contact manager.

Need to file that whopping \$3,500 expense report in triplicate? E-mail it. QuickXpense supports VIM- and MAPIcompliant mail systems. There's also a useful reconciliation module that lists charges for credit cards. And managers will appreciate QuickXpense's analysis engine for tracking travel and expense spending RICH SCHWERIN patterns.

USABILITY: The Welcome Interview is a friendly start. time-saving touches avoid

repetition. **** TECHNOLOGY: Supports VIM and MAPI e-mail systems. powerful analysis tools for managers, ****

VERDICT: Quick utility for a dirty job. * * * *

FILEBOX

QuickXpense

Competition: State of the Art's Expense It! comes close, but QuickXpense is easier to use.

Minimum System Requirements: 386 CPU. Windows 3.1, 2MB of RAM 2MB of free harddisk snace.

(800) 626-8620, (206) 637-8808

Visual Baler

Build a Better Spreadsheet

Do you really need all of the features in Excel 5.0 or Lotus 1-2-3 5.0 for Windows? If your department has modest spreadsheet requirements, consider developing custom spreadsheets with Baler Software's Visual Baler, a small and efficient compiler for distributing worksheets, royalty-free. Visual Baler lets you import

an existing spreadsheet or create one from scratch. Creating a spreadsheet is as simple as typing text and formulas, then formatting cells and ranges using the right-mouse button. But since the program supports only the WK1 and WK3 formats (Lotus 1-2-3 2.01 and 3.x, respectively), you have to save to that format if your source spreadsheet is Excel.



Ouattro Pro, or a newer version of Lotus 1-2-3.

When you're ready to compile a worksheet, select the Bale option to create the runtime version. To further customize the application, you can generate your own help screens (the Microsoft Help Compiler is included) and dialog boxes.

Bale It: Visual Baler turns spreadsheets into small runtime applications that you can distribute royalty-free.

Missing from Visual Baler is support for OLE, ODBC drivers, recordable macros (you have to type macros by hand the old-fashioned 1-2-3 way), and charting capabilities. Baler expects to release an upgrade in the first half of 1995 that will USABILITY: No programming required. If you can use a spreadsheet, you can use Visual Baler, ****

TECHNOLOGY: Supereasy application builder, but we'd like to see OLE. charting, and ODBC, ***

VERDICT: A few caveats aside, it's an inexpensive way to compile apps. * * * *

FILEBOX

Visual Baler

Available Separately: InstallShield Setup Wizard for a royalty-free, professional-looking installation module to accompany compiled worksheets (\$149).

(800) 327-6108, (708) 506-9700 Reader Service No. 618

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capabilities.



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Plug and Play capable



Don't Hold Your Graphics Hostage

HiJaak, the best-known name in the screen capture business, has moved from the utility room to the suite—HiJaak Graphics Suite, that is.

Inset's HiJaak Graphics Suite combines improved versions of its highly respected HiJaak Pro and HiJaak Browser utilities with three new additions: HiJaak Smuggler, HiJaak Draw, and HiJaak TouchUD.

HiJak Pro, the screen capture and file conversion utility that anchors the suite, now has a trace function for converting raster (bitmap) images to vector graphics. HiJak Browser is designed to launch programs and generate thumbnail views. HiJak Smuggler complements the browser by importing graphics into any application that permits Clipboard pasting.



Thumbs Up: HiJaak Browser serves as a visual file manager for graphics files, letting you view their contents, convert formats, or search for keywords.

HiJaak Draw is a modified version of Gold Disk's Professional Draw.

HiJaak has always been a versatile graphics utility. But the HiJaak Graphics Suite, at less than \$100, quite simply offers more graphics bang for the buck than anything else out there. CHRIS O'MALLEY USABILITY: It's clean, visual, and organized. ****

TECHNOLOGY: Supports
75 raster, vector, and fax
image formats; navigation
is a snap; no other utility
on the market juggles
graphics formats
better. *****

VERDICT: An indispensable graphics utility, even if you already own a drawing program. * * * *

FILEBOX

HiJaak Graphics Suite

Formats: Adobe Illustrator's EPS, CorelDraw's CDR.

System Requirements: 4MB of RAM, 25MB of free hard-disk space.

599 est. street price Inset Systems (800) 374-6738 Reader Service No. 639

Alpha Five

Point-and-Click Database Design

Alpha Four for DOS, which has enjoyed cult-like popularity, has been revamped for Windows to include tabbed dialog boxes and drag-anddrop design surfaces. Aimed at small businesses, Alpha Five lets companies set up a powerful database without hard-core programmers on hand to help.

In addition to its enhanced usability features, the new version includes support for multiple index (MDX) files. Open a database in several windows (or sessions) at the same time, and any change you make to one session is automatically reflected in all the others. Especially impressive are

the data validation tools (called Field Rules). A field defined as a credit card account, for Guide to the Ratings: *



I Dream of Genie: Need help? Alpha Five's Query Genie walks you through the task. Unfortunately, this is one of only a few Genies in the program.

example, won't accept any values in a format other than the card's number format. Alpha Five attempts to

attract programmers and developers with the addition of the Xbasic language, which looks like Visual Basic with a bit of Xbase thrown in. That's a good start, but it still needs ODBC, VBXs, and OLE 2 support. As of this release, there's also no compiler; a runtime version is the scon. ROGER w. SAUER USABILITY: Tabbed Control Panel is well designed, easy to navigate, ****

TECHNOLOGY: Exceptional data validation features, but no ODBC drivers.***

VERDICT: An impressive end-user database management system, but weak on sophisticated development tools, ***

FILEBOX

Alpha Five

Competition: Lotus
Approach 3.0, Microsoft
Access 2.0, and Borland's
Paradox 5.0 are better
database developers,
but they require more
administration.

\$119 est. street price, \$70 for upgrade Alpha Software Corp. (800)799-6877, (617)229-2924 Reader Service No. 640



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LET'S START BY SAYING THAT this is unashamedly an ad for the ASIT Bravo MS. And the assumption we're making is that you're currently weighing the implications of moving over to one of the new 32-bit toperating systems, like Windows'95.

On the surface of it, there are hundreds of desktops to choose from.

Obviously, they have to be Plug and Play ready to even be in the running. And, of course, they have to be affordable.

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or we wouldn't be mentioning them.

But there's something else we haven't
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enables you to update all your Bravo MS

desktops from a central location.

AST has it, the others don't. With theirs, you'll have to reconfigure each of the computers on the network individually. And the more you have, the bigger pain it will be.

What more can we say? Except that the Bravo comes in low-profile, mid-size and mini-tower versions. And ASToffers 24-hour/7-day telephone support, a 3-year limited warranty-(first year on-site) and comprehensive reseller support in the field.

Talking of resellers, you might want to call us at (800)876-4AST for the name of the one pearest you.

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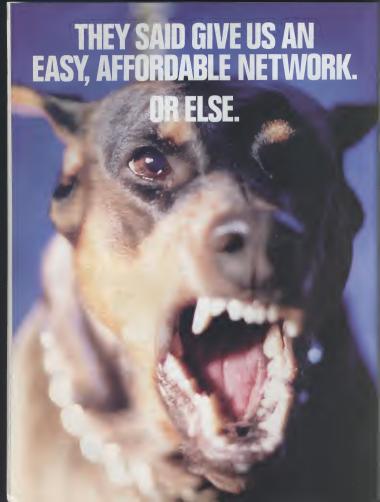
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If your business is serious about finding an easy-to-use, affordable network operating system, just give us a call. We'll give you the name of the nearest Artisoft Premier™ and Artisoft Advantage™ Partner so you can start networking just like S.G. Security Systems. And our other 2.5 million satisfied users around the world

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New! NETWORKING

NetWare 4.1

An Easy Way to Raise Your Net Worth

How's your network administrator looking these days's Energetic, enthusiastic, eager? Not likely. Novell made big strides with NetWare 4.0, but installation was needlessly tough, the administration tools were a hodgepodge of graphical and character-based utilities, and the client drivers, which were supposed to load into upper memory, flat out didn't work. The good news for your network administrator? NetWare 4.11.

NetWare 4.1 corrects these problems and offers Version 3.x users even more incentive to upgrade: It's priced exactly the same as NetWare 3.12 and, with additive licensing, makes increasing the number of users affordable. Add to that a truly automatic setup, a full suite of graphical administration utilities, and Novell's new NetSync utility (which automatically synchronizes all your NetWare 3,x and 4,x servers), and it's easy to see how upgrading to Version 4.1 will pay for itself in no time.

The Big Easy NetWare 4.1 corrects the single-CD installation problem of Version 3.x by supplying the complete documentation on a separate disc. Now it's actually available when you or your network administrator need it most—during installation. The irony is that you probably won't need it. NetWare 4.1 automatically sets up a simple flat directory that you can keep or modify as the network prows.

NetWare Directory Services (NDS) is a distributed database of every object on your network that replaces the bindery

PCCNW41
BLABSLASER A PROFESS_COLUM A american DOCUMENT DOCUMENT A SNAYLOR - A USER_TEMPLATE - B PCCNW41_SYS Labe Maio Server Server used for administration of all other servers on the Labe network MDELETED.SAV . POLOGIN PCC Performance Lat MAII En PUBLIC MISYSTEM BACKOUT.TTS PC Competion 8 ... TTS\$LOG.ERR IPX: 20717-52-040000 WOLDLOG EDD

Sick of Syscon? Novell's update of its venerable NetWare operating system lets you manage your entire Novell network from a single screen via the Windows-based NetWare Administrator. You can create, view, and modify servers, users, printers, groups, or any other object simply by dragging and dropping icons. It's a fair cry from the cryptic text-based Syscon utility found in Netware 3.x.

Described of all other conscience of all other consciences of all other con

USABILITY: Not quite NT, but far easier to set up and administrate than previous versions of NetWare. **** TECHNOLOGY: Look for others to coty NetWare Directory

> Services; we'd still like to see automatic hardware

time to upgrade. * * * *

detection. ****\square VERDICT: Still running
Netware 3,x\hat{\chi} Now's the

A. Navigation shortcuts are everywhere

in the new NetWare. The directory tree

sits at the top of every NetWare 4.1

Punt PConsole! NetWare 4.1 gives you a quick view of all available printers. To connect to one simply drag and drop the icon for an available printer onto a port icon.

in previous versions of Net-Ware. Will is save you time and money? Definitely. For example, adding or removing a user on a five-server, three-printer network without NDS means manually entering all the user information on each server. With NDS you simply create the user profile once, then drag and drop it onto the objects for which you want to great rishts.

And since NDS is a distributed database, its power is global and spread over the entire network. Instead of logging ont on eserver or several servers one at a time, you log on once to the network. And if one server fails, users can still access the remainder of the network. You specify how many copies of the directory there are and where they're located. Best of all, now you can take advantage of all the benefits the NDS offers without having to build one from scratch.

More Room to Move Novel understands that there never seems to be enough storage space on your server. The company added storage compression to NetWare 4.0 to address this problem, but paid for it with a substantial performance hit. Not so with Net-Ware 4.1, which improves the compression performance and adds another storage feature, the High Capacity Storage System (HCSS).

HCSS expands your server's capacity by integrating optical

FILEBOX

NetWare 4.1

Competition: Windows NT Server, Banyan VINES.

New Features: NetSync (central administration); DSMerge (directory tree merge); High-Capacity Storage System; updatable, distributable NDS; AppleTalk Filing Protocol. The Netware Administrator replaces PConsole and Syscon.

From \$1,095 direct for 5 users to \$47,995 for 1,000 users Novell (801) 429-7000 Reader Service No. 641 SIDE BY SIDE

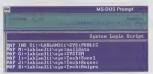
FASY UPGRADE: NETWARE 3.x TO NETWARE 4.1



Tedious Entry: With NetWare 3.x. creating a new user account through Syscon meant manually entering details about the users' systems.



Ouick Connections: Under NetWare 4.1, all objects-including users and servers-are created with the graphical NetWare Administrator.



Tap, Tap, Tap: Connecting to a network drive with NetWare 3.x required typing hard-to-remember commands in the System Login Script or at the prompt.



No More Memorizing: With NetWare 4.1, connecting to a drive is as easy as moving a file in File Manager. Simply use the NDS to view your servers, then pick the directory you want and drag it onto a drive letter.

disks in the form of a jukebox in NetWare. Any files that fall into disuse are automatically moved to the jukebox, which frees up space on the higherspeed hard disk. When those files are requested, they're automatically delivered to users as if they were still on a hard disk.

Integration at Last Net-Ware 4.0's inability to integrate well with existing networks was one of its biggest liabilities. Now, using NetWare 4.1's new NetSync network loadable module (NLM) utility, you can centrally manage up to twelve 3.1x servers. This way you can make changes on one NetWare 4.1 server, and other servers will be automatically updated.

With NetWare 4.1, Novell

has also directed its improvement efforts toward workstations. Workstation setup can now be done from a CD on the workstation, or you can create workstation disks from any system with a CD. In addition, the client software is new and features auto-reconnect. Now when you lose your connection to the server, you won't have to reboot. Instead, you'll dynamically reconnect.

Not leaving anyone out, Novell wrote new client software for OS/2 and Macintosh systems that gives them direct access to NetWare 4 servers and all the power of NDS. The company also added support for TCP/IP on workstations. which gives DOS and Windows

clients access to Unix systems. Load up the new AppleTalk

Print Services (ATPS), and Macs can access any printer on the network, whether or not it's running on AppleTalk. Now even PCs on the network can get to those great AppleTalk printers in the art and marketing departments.

The NT Ante Feeling the heat from Microsoft Windows NT 3.5. Novell focused closely on usability improvements with NetWare 4.1. Nevertheless, Windows NT is still by far the easiest network operating system to install, and it supplies a complete collection of drivers. Novell also still can't touch Windows NT's automatic hardware detection. though NetWare 4.1 gets closer than previous versions.

In the fault-tolerance arena, however, NetWare now goes beyond the disk mirroring found in most network operating systems-it mirrors the entire server. Two servers are connected with standard network adapters and a high-speed mirrored server link (MSL), If a server fails, its mirror automatically takes over with no interruption of service.

Whether you're adding to your existing network or starting from scratch, NetWare 4.1 is powerful and easy to administer. For NetWare 3.x users, Version 4.1 is finally a reason to upgrade and will quickly pay for itself. ADAM MEYERSON

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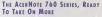
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The Multifarious Online Message Tool

I have a love-hate relationship with ConnectSoft's E-Mail Connection 2.0. I use it religiously several times a day, seven days a week, because it does what no other application does: It automatically sends and receives my e-mail from CompuServe, America Online, and MCI; it lets me read and respond to messages offline in a Windows interface; and it keeps one databot of all my e-mail addresses so I never have to mess with finicky e-mail strings. That makes it worth of my love

But there's the hate part, too: E-Mail Connection is a quirky program that doesn't remember the maximized position and size of the tool windows in its InBox, OutBox, and Address Book; it doesn't automatically resize windows if you resize

the program window, and the keyboard shortcust aerd well thought out. In the Address Book, for example, you can type letters to automatically search for a name, but once you find it, you can't just press Enter to choose the name. Similarly, the InBox shows a graphical tree called the Target Folder List that lets you choose which user-archive folder to file previously read messages in, but you can't double-ciked on one of these folders to open it.

In addition, I encountered a glitch in E-Mail Connection when I tried editing messages: The program started dialing out on its own, even when the autodial feature was disabled. At first I thought I had hit the wrong button by mistake, but it turned out to be a recurring problem.

I use E-Mail Connection 2.0 because there's nothing else like it. I need one way to retrieve, reply to, and sort messages from all of my online services, but its usability flaws and some highly unusual transmission quirks make me pine for something better. I'm keeping my eye on any competitor that comes close. SCOT FININE SCOT FININE

E-Mail Connection 2.0 / ConnectSoft / (800) 234-9497 / \$50 est. street price / Reader Service No. 642

Logbook Entries:

have 6 1004. Thoma's no designer for m

June 6, 1994: There's no driver for my external 14.4 Practical Peripherals moden, a very popular model. Also, I get erratic moden error messages when I dial out.

July 14, 1994: After trial and error, I discover that the modern problem occass only when I've used Lotus Notes to dial out on the modern before dialing out with E-Mail Connection. I resort to turning the modern on and off after I use Notes and before I use E-Mail Connection.

December 15, 1994: A friend who uses E-Mail Connection is also baving problems and calls ConnectSoft. The company sends ber a slipstream upgrade of Version 2.0. She makes a mistake during installation and ber E-Mail Connection database is completely corrupted. I back up my own files immediately.

Logbook Entries:

September 26, 1994: I book up my Kinesis Ergonomic Keyboard, and it feels weird. The Backspace key is by my right thumb, which goes against my instincts. I decide to trust Kinesis on this for now.

October 27, 1994: Now the Enter key bugs me. Instead of using my left pinkle, it too is located by my right thumb. Fortunately, I'm making fewer mistakes—and I'm unlearning my previously awkward keystrokes.

December 3, 1994: I use someone else's keyboard and find myself trying to backspace by bitting the space bar. Now I hate the layout of a conventional keyboard!



Keyboard Therapy

Giving up the Kinesis Ergonomic Keyboard for just one day (when it had to be photographed) was one of the hardest things I've done lately. Of course, the first few days I used it I wished I hadn't offered to review it. But it grew on me.

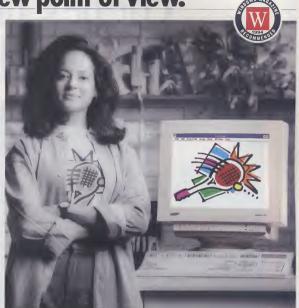
The placement of many keys, including Backspace and Enter, initially made no sense although the keyboard uses the QWERTY layout. But the more I typed, the more efficient my typing became as my

fingers naturally fell to those traditionally hard-to-reach keys such as V, B, and T. This keyboard is designed for touch typists, and I've already reaped the payoffs. I just had to get past that initial stage of discomfort to unlearn my unergonomic behavior.

A couple of things have never quite felt comfortable, though. As an avid Windows user, the placement of the Cril and Alt keys has never felt right. Similarly, the placement of the arrow keys makes it difficult to use the keyboard to select text, and so I use my mouse more often. The lack of a numeric keyrad is another drawback.

Now whenever I use a traditional keyboard, my hands feel cramped, my fingers contort to hit some keys, and I make more mistakes because my fingers don't fall naturally on the keys. In other words, I'm a Kinesis convert. KYLA K. CARLSON

Kinesis Ergonomic Keyboard / Kinesis / (800) 454-6374 / \$390 est, street price / Reader Service No. 643 Samsung A new point of view.



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Andrew Wargo, Manager at Baxter Land Andrew Wargo, Manager at baster Lana Company, tried two other brands before Back-UPS. "One lasted a few days, a second one went up in smoke after 48 bours, a third lasted less than 24 bours! I then bought my Back-UPS for less than balf of what I had paid for the others. We've purchased three more Back-UPS and for the past 14 months they've been just hummin' away on the same power line that was eating the other brands alive!"



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Tripo



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Back-UPS (L to R) Application

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small minis, telecom equipment



Don Truax knows first hand about Back-UPS reliability: "It ought to be against the law to huy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked Each morning I get a surge down the line and both APC's hate it - they simultaneously 'holler 'n clamp' while my 'Brand T' quietly sleeps in. I've relegated that unit to non-critical household stuff like my VCR."





"One lasted a few days, a second on went up in smoke after 48 hours, a second one went up in smoke after 48 hours, a third lasted less than 24 hours! I then bought my Back-UPS for less than half of what I had paid for the others. We've purchased three more Back-UPS and for the past 14 months they've been just hummin' away on the same power line that was eating the other brands alive!"



More than...

APC has won more awards for performance and reliability than all other UPS vendors combined...including five consecutive LAN Times Readers Choice awards...









can be hard...if you wait for the next storm to roll through. But discovering how affordable it has become is easy...

Call today and find out (the easy way) why more than 2,000,000 satisfied users bank on Back-UPS from APC. With more awards than all other brands combined. field-proven reliability, and a two year warranty, Back-UPS are power protection you can purchase with confidence.











Instantaneous backup power beats

Unmatched lightning (tested to UL1449) and surge protection for maximum hardware safety

Network-grade line conditioning and EMI/ RFI filters prevent glitches

LAN Interface (on Back-UPS 400 and up) LAN interface (on back-Ors 400 and up) provides automatic shutdown to all major Os: Windows, NT, NetWare, LAN Server, LAN Manager, LANtastic, Unix, OS/2, Vines, AppleShare/System7 and more.

Site diagnostics automatically spot missing ground and reversed polarity, two common miswirings which usually require an

Option switches allow you to customize transfer voltage and alarm settings.

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2 year warranty and full safety approvals including ISO9001.

\$25,000 Lifetime Equipment Protection

Hot Swappable, User Replaceable Batteries reduce service time, costs by allowing safe



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Find It &

SYNOPSIS

MONEY MATTERS: Current financial facts, 114

TREND SPOTTING: Get the jump early. 116

HIVES OF INDUSTRY:

HUMAN RESOURCES: Find workers online. 124

MARKETING: Where to advertise. 128

DOING BUSINESS: Sites for spending. 135

SCAVENGER HUNT 140

REALITY BYTES 142

You connect everyday with clients, associates, employees . . . even lawyers. But making business connections in the '90s is more than this. To make the most of every resource, sooner or later you'll be hooking up to a remote computer and trawling the online world.

The hugely popular America Online, Compu-Serve, and Prodigy, and the phenomenal Internet (which these services can now access), are more than just reference libraries. For businesses, they can all be valuable in the search for information, people, and ways to do business.

The challenge lies in finding the service that can deliver the kind of information your business needs. Do you turn to the immense but chaotic Internet or to the more organized and accessible commercial services? Which can best satisfy your needs with fast, up-to-date intelligence? How do they compare in cost? Which is populated by the people you need to make your business thrive?

And which is the best to choose if you're trying to sell your products or services online?

The Great Quest. We scoured America Online, CompuServe, Prodigy, and the Internet to help you answer these questions. Basically, we wanted to know three things: the quality and quantity of information available, the cost and efficiency of accessing and retrieving it, and the likelihood that the material would be able to meet your needs.

First we looked at how quickly and conveniently you can find information—financial data, details about trends, and information about specific industries. Then we explored the possibilities

SUPPORT NET: Hewlett-Packard's SupportLine Services shows how creative companies can provide strong customer service on the World Wide Web. Click on buttons to read support news, retrieve software patches, and search a database for product information.



A QUICK WAY TO GET RICH: CompuServe's Finance area is a wellspring of worthwhile services. Here's just such a service, QuickWay's company analyzer. But before you jump in, check the early warning signs: dollar signs after some of the items tell you that accessing them costs extra.



Do It Online

of using online services as a forum for conducting business—finding potential employees, marketing and advertising, and selling and supporting your products and services. And as a litmus test, we sent our online experts on a "seavenger hunt" to ferret out solution's to 20 typical business questions as quickly, easily, and inexpensively as possible (see pages 115 and 125).

How inexpensively? There's the rub. Each service has monthly costs, but only with the Internet does one price get you on almost every ride. For the three commercial services, the monthly charge covers a specific number of data sources and many of the more desirable services out extra.

Met Costs A typical Internet account through a 14-4Kbps modem will run you between 528 and 454 a month, depending onthe service provider. The price includes a specified number of online hours, normally from 20 to 50, and you're charged between 50 cents and \$2 for each hour thereafter. Very rarely, however, are you charged for accessing an individual area unless it requires you to establish a separate account with

them. Within your allotted time, you have access to everything the Internet has to offer. And if you use the Net a lot, your service provider will almost certainly offer an unlimited-use option, but you'll need to use it a lot to make it pay—the charges are usually between \$250 and \$500 a month.

Things change with the commercial services. Monthly rates are much lower, with America Online clocking in at \$995, Prodiegra \$14.95 for its Value Pack service, and CompuServe at \$8.95 for its basic plan (the Executive option is \$10 extra). But it doesn't stop three. Many forums in GompuServe cost extra, and while America Online are Prodigy are kinder in this regard, all three services offer databases and forums that cost over and above the standard monthly connect charge. And several of the most important business and reference databases charge by the search or retrieval. That monthly \$8.95 each saily fulloom to \$100 and bevond.

Online Surfers Along with access to data, one of the big attractions of these services is the people you find. You also have access to millions of users across a

wide demographic spectrum. The trick is knowing where to find the people and resources you need most.

Read Me There's no substitute for spending time on the forums yourself to make the right contacts and find pertinent information. But if you know what you're looking for and don't have time to burn, the six sections that follow offer starting places.

Divided into two parts, this feature starts out by showing howe find useful business out by showing how to find useful business information online financial overviews and specifies, market trends that may affect your business or provide new opportunities, and ways to keep track of the industry of your hoise earost the wires. The second portion focuses on how to do real work onlines thiring people, marketing or advertising your business, and doing business by modem. Check out the "Top bix Sixes" lists in each section. These offer a quick list of places you'll want to go soon. If you're surfing this feature like you surf the Net, they're the first wave you'll want to catch.

BY NEIL RANDALL

EVERYBODY GET ONLINE: America Online's opening pages illustrate this fast-growing service's emphasis on usability. Three quick clicks take you to relevant, specific articles with a business perspective—and also provide quick links to major business newspapers and related Internet Gophers.



NOT JUST FOR FAMILIES ANYMORE: Prodigy's Business/ Finance page typifies the service's high degree of usability-developed from its home-use origins. Access each numbered item or button with a single click. Hint: The Financial bulletin boards area is a good place to start.



Find It Right Now

Online services lend new meaning to a tired expression: Online, time really is money. You don't have time to log on to a service and conduct all the searches you'd like. And nobody in their right mind would spend more money than the information is actually worth. Here we compare the online services for finding information about money, trends, and specific industries. What's available? How do you find it? Is it worth the price? You have to have answers to these questions, because you have to be able to justify the time and energy expended.

We ferreted out the really useful information about finance, business trends, and industry-specific developments from each of the three commercial services and the Internet. Then we pitted the services against each to discover which service is best for you.

Money Matters

The minute you entered the money arena, one thing became clear You need detailed financial updates constantly. So you developed the usual routine devour the business section of the morning paper, follow money issues at every possible opportunity during the day, and channel-surf at night to the stock information channel on your cable service.

That's the old-fashioned way. While there's no

substitute for the business section over that first cup of coffee, once you join an online service, continual updates are yours for the asking. Almost anything you could want to know can be found on any of the services. All you have to do is decide which is best.

The Internet Locating financial updates demonstrates both the Net's greates strength (wide-ranging information at no additional cost) and its greatest weakness (disorganization and search inefficiency). You can find this information at several sites on the Net, but the best way to start is to access a subject listing until you grow familiar with what else is available. There are several of these out there, but one of the best is known simply as Yahoo, located on the World Wide Web at http://akebono.stanford.edu/yahoo/Economy/Markets_and.Investments/

From here you have several links to mutual funds and stock information. Under the Mutual Funds heading are mutual fund charts from MIT, the Nest Fgg Mutual Fund Information Center, and the Security API. Quote Severe, with its extremely attractive offer of unlimited free quotes. This service also provides specific links to Invesco Funds, Janus Funds, and Kaufman Mutual Funds.

Recently, a new quote site has appeared on the Web. QuoteCom, located at http://www.quote.com/



Cash for Service: QuoteCom is one of World Wide Web's few extra-charge services. The empty buttons hint at growth to come.

quothml, provides a full series of up-to-theminute quotes and a tiered registration system. You register for the free service, which entitles you to five free quotes per day. Basic service, the next level up, costs \$9.95 per month (chaper by site license) and opens your options considerably, including [100] quotes per day. You also get BusinessWire and PR Newswire subscriptions as a homus incentive for this amount of the provided of the p

If you're not equipped for the World Wide Web, don't despair. Stock market information is everywhere for the asking, Just use a Gopher to get to wuecon.wust.ledu and enter the richly detailed Holt Reports directory. Also available from this Gopher is Huang's Weekly Futures Market Report. There's no question, however, that the Web provides the easiest access to financial information, so even if you lack a graphical browser, you owe it to vourself to access it.

America Online Á wide range of sources for financia linformation is available on America Online, but it's stronger as a general business source. Still, there's plenty to get engrossed in if you're a money-watcher. The American Association of Individual Investors offers a full online service, complete with information about retirement planning, mutual funds, and portfolio management. Decision Point Timing and Charts offers up-to-date stock and mutual fund charts. A service called Top Advisors' Corner features newsletter-type advice from professional money people. The Investor's Business Daily features everything from details about the economy to substantial information on markets and investments.

Into mutual funds? Then you'll want to spend considerable time in the Morningstar Mutual Fund area, which includes information about international stocks and funds as well as those in the United States. The Quotes and Portfolios section lets you search for stocks by name or symbol,



American Investments: We found AOL's Quotes & Portfolios the most usable online resource for finding company information.



Compu\$erve Information: FundWatch
Online searches for fund performance
based on a wide range of user preferences.

while Your Money magazine keeps you up-todate on your financial status and offers links to other financial planning resources. Finally, Market News lists closing averages, most-active and largest-change information, international markets, and commodities for the current day.

CompuServe By virtue of the sheer volume of monetary numbers available, CompuServe outweighs everything else available. As a starting point, type Go Finance. But be prepared for the inevitable: Many of the best sources incur additional fees, and although they're relatively inexpensive for one-time searches, the price can be exorbitant if you use them daily to obtain quotes. Current Quotes, for example, offers an extremely fast and useful service, but it surcharges your CompuServe account 1.5 cents per quote, Hardly a catastrophe, but if you want 100 quotes per day, you're up to \$45 per month-about the same as you'd pay for the World Wide Web's Quote-Com, which offers plenty of worthwhile extras. Another example is the News-A-Tron Market Reports, which charges you a \$1.25 flat fee for as much information in one sitting as you can garner. None of these services costs much individually, but put them all together and you can work up a whopping bill in no time.

Still, CompuServe's non-surcharged services can be immensive useful. Basic stock quotes are there for the asking, as is access to FundWatch Online by Money magazine. FundWatch Online bets you check you causiting or considered funds according to eight investment objectives (such as aggressive growth), then displays the results in one of seven ways (including ten-year annualized). Not until you enter the Extended Products section of the Finance section, however, does the full value of CompuServe's offerings come through. Current Quotes, Current Market Snapshot, and information about commodity

Scavenger Hunt

Every month on the Internet, a group of diehard Netheads gets logether and compiles a list of 20 rurvia items that they know can be found on some Web server or Gopher site somewhere in the world. Then they challenge gamesters to go out and find them. It's a great diversion, but when we decided to set a PC Computing challenge, we changed the rules of the game a little game a little.

1. We collected four experts to be our panel of intrepid hunters author and educator Neil Randail took Prodigy, PC Computing editors Rich Schwerin and Howard Baldwin took the Internet and America Online, respectively, and PC Contact sysop Paul Fredman took CompuServe and ZiffNet.

2. We set 20 questions gleaned from the sections in this feature. For the "Find I" portion of the feature, we asked questions on money matters, market trends, and mousty-specific issues. For the action-oriented "Do It" half, we asked questions about finding personnel, marketing your company, and transaction business online.

3. This wasn't a trivia game. We asked questions that businesspeople need answers to. What's the best loan rate? Where are the corporate tax tables for Delaware? Have the profits in a given industry gone down over the past two years? How can I market my business in the Pacific Rim?

4. We set a time limit. If they couldn't find the information in a single sitting—no more than three house—the instructions were clear. Put down your pencils and turn in an incomplete report.

5. We didn't know whether the questions we were asking could be answered online. As it turned out, more than half of the questions were easy to answer in the allotte time. In fact, Paul Freedman Jitpped through CompuServe to gain more than 60 percent of his answers in less than two hours.

6. We weren't just looking for answers. Much more important to us was how easy and how satisfying it was to get to the facts—and how complete the answers could be. In most cases, our scavenger hunters were pleased with some of their results, and reckoned a well-placed phone call or trip to the library would have served them heter for others.

For a rundown of sample questions and answers, see page 125. For the lowdown on how the hunters rated each service, check out the table on page 140.

Money Matters

The Top Six Sites

Check out Economy:
Markets and
Investments (http://
akebono.stanford.edu/
yahoo/Economy/Market
s and Investments/).

The Security APL Quote Server (http://www.secapl.com/cgi-bin/qs) on the World Wide Web features a continually updated Dow Jones Industrial Average and unlimited free quotes.

The Top Advisors Corner (keyword: Advisor) on America Online has information and advice from experts.

America Online's Morningstar Mutual Funds area (keyword: Morningstar) gives you news and information about mutual fund behavior, and even a "lounge" where you can discuss mutual funds.

The Personal Finance forum in CompuServe (Go Finance) gives you access to a range of publications and tools to keep track of money matters.

Prodigy's CNBC-Markets area (Jump CNBC) features information about markets and a direct link to the CNBC bulletin board for discussion. markets are all easily accessible (with surcharges), and the VESTOR buy-sell recommendations service is also here, albeit with an additional \$45-per-hour charge. To shave every spare second off these high rates, use Compu-Serve's Navigator or another software package that logs on and checks quotes efficiently.

Prodigy The jumping-off point in Prodigy is the Business and Finance area (Jump Finance). This section still hasn't reached a critical mass, mainly because of Prodigy's beginnings as an acsy-to-use family-oriented service. Still, there's a considerable amount to go on here, including an area for quotes, markets, and online trading and banking.

The Quotes button takes you to a usable system for extracting current market quotes. It also lets you track historical data through charts at 50 cerns per chart or less for Strategic Investor subscribers—a special feature that costs \$14.95 per month for unlimited use. The Quote Check area includes company news, and if you find companies you

want to track, you can add them to one of a number of customizable "tracks." There are also several worthwhile bulletin boards for discussing money issues, including the Money Talk bulletin board accessible through the Business and Finance area.

The Finance area also gives you access to the CNBC Market Update—a great resource for a brief glance at the American Stock Exchange, NASDAQ, bonds, mutual funds, and world markets. Prodigy's discussion forms also provide a service here, especially if you want opinions on certain investment types.

As usual with Prodigy, information is presented concisely and readably, but you'll find yourself wishing for more. Keep in mind that Prodigy was originally designed for people to use in the home rather than as part of their busines. This family-oriented, casual-use background goes a long way toward explaining its quick-ant-digestible nature. If all you really need is broad overview, this is the USA Today of online services—just the service to get bite-sized nuggest from.

Trend Spotting

Knowing how your current investments are doing isn't enough. You also need information on what will happen in the future. The secret is spotting trends, and for that you need expert help.

The good news is that you can get that help online. The bad news is that it doesn't appear in a consistent format and it's not always the kind of help you need. Generally speaking, the Internet is the most useful source for gathering news and tracking economic indicators. The three commercial services focus much more closely on individual financial considerations.

Of ourse, money trends are only one weapon

Of course, money trends are only one weapon in your business planning arenal. Demographic information is also crucial, and it's available in prefusion online, especially via Compuberve and the Internet. For concise, easy-to-find information, the commercial services have a distinct advantage. But international coverage is the Internet's strong suit: Try the demographics Gophers in North America, Europe, dustralia, and the Pacific Rim.

No matter what service you use, don't ignore the news sources. All of them post business news as soon as it's available, from newspapers and magazines such as the New York Times to The Economist. Even if you do nothing except keep up with the current articles, you'll stay on top of financial and market trends.

The Internet If you're going after global economic trends, the Net is the place to go. This is understandable considering its history as an academic/research system, but the result is that the Net is less immediately helpful than the commercial services if you're following your personal portfolio rather than the Great Keynesian Debate. And the World Wide Web is quickly becoming



Prodigious Market: Take a quick look at the day's world markets and more from Prodigy's CNBC Market Update service.



Economic Safety Net: The Internet's Economic Bulletin Board shows trends in trade, employment, income, and more.

the best place to be, but Gopher and Telnet can still get you to rich sources of information.

The best spot on the Net for economic and commercial trends is the Economic Bulletin Board at the University of Michigan (Gopher to una.hh.lib.umich.edu or telhet to ebb.stat-usa.gov and log in as guest). From here you have access to a huge range of economic indicators, which makes it easy to pick out the trends you wish to follow. This service provides specific industry information alongside historical archives of economic data—a killer combination for trade issues.

One of the Net's more useful sources for economic trends is the Gopher based in the Netherlands and located at zeus.nijenrode.ml (the path to follow is Business, then Statistics, Americas, North, USA). From here you can tap a vein of U.S. census dan, labor statistics, U.S. Department of Commerce information, and other wellsprings of economics and demographics. This is also the Gopher you'll want for research if you're doing business internationally.

The trick to finding demographic and financial trends via Gopher is using meta-lists. Of particular importance is Gopher-Jewels, found by gophering to cwisuse.edu. Here you'll find links to financial research, demographic Gophers, economic information, and practically any other subject under the sun. Search here and plant bookmarks so you can come back often.

If you prefer to do your searching on the World Wide Web, one of your best stops is the newsletters subpage of the Yahoo directory, which is at the end of this massive address: http://akebono.stanford.edu/yahoo/Business/ Corporations/Financial_Services/Investment_ Services/Newsletters/.

Yahoo's newsletter packs a variety of investment and trends-based information, including the Sector Fund Newsletter, ProfitMaster (with its useful forecasts of stocks), the Mutual Fund Forecaster, and more. And if you're the kind to take advice from experts, brokerage firms offer recommendations here with frequent updates.

America Online To examine trends on America Online, swine immediately into Decision Point Timing & Charts. Here you'll find daily trendsrelated charts in the form of graphics interchange format (GIF) graphics files for download. (If you don't have a graphics program with GIF support, the site offers one for download). The charts include Dow Iones Industrial, Transportation, and Utility averages over the past three years, Popular Market averages; a three-year daily chart of the McClennan Oscillator; and charts for gold, oil, Treasury bills, and dollar values. And then there are magazines; Worth Online features the investment tips and fascinating reading on the world of finance that you've come to expect from its paper version. Consumer Reports looks at trends of a different sort—useful for details about specific products.

Among the more useful trend-sporting areas on America Online is the Investor's Business Daily. Here the Economy area features a host of worth-while articles, many of them dealing, with specific monetary trends, including inflation, trade, and international discussions. Also extremely valuable is the Economic Indicators section from this area. It has indicators for factory orders, farm prices, industrial production, and many more. And you can spot trends within the Business News section of America Online, especially in the frequently updated Top Business news features.

CompuServe You don't always have to pay a surcharge to track the latest trends on CompuServe, but it helps if you're prepared to. In order to get a good general sense of what's going on, wisit the Business Almanac through the main Finance area. Much of this material is presented in the form of standard downloadable tables, but the



News Online: The Investor's Business Daily links up-to-date investment and economic news to other valuable trend-oriented data.

Trend Spotting

The Top Six Sites

The Economic
Bulletin Board
(una.hh.lib.umich.edu)
is a Gopher or Telnet
area full of financial
and economic data.

2 Dutch Gopher zeus.nijenrode.nl is a superb collection of European financial information. It's also strong on other areas, including the Americas.

Investor's Business Daily on America Online (keyword: ibd) links you to a wide range of monetary and market trends. Start with the Economy button.

The charts and tables on America Online's Decision Point (keyword: DP) track financial trends and provide links to further research and discussion boards. And if you're a little shaky on stock chart analysis, take the online course.

CompuServe's Earnings and Economics Projections (Go Earnings) gives you census data and links to international financial reports, Standard & Poor's full online service, and InvesText.

6 Prodigy's Business and Finance (Jump Finance) features retail sales and employment statistics, and more.

Industry Watch

The Top Six Sites

The Securities and Exchange Commission EDGAR filings at gopher..town.hall.org can direct information from a huge range of companies your way.

ClariNet
newsgroups (see
http://www.clarinet.com
/index.html for details)
offer a constant stream
of industry-related news
and discussions

Don't miss the Government and Business area in America Online's Business News

Access and download company reports from all manner of industries using a premium service, InvesText (Go Invtext), from CompuServe.

Hoover's Company Database in CompuServe (Go Hoover) features extended profiles of more than 1,000 of the most influential companies in the world. Among the details: executive names and corporate strategies.

Dun & Bradstreet Solutions on Prodigy (Go D&B) offers information about specific companies and industries. You can search the database by type of industry.

range of information these tables yield is outstanding. On offer here are Dow Jones Averages, Standard & Poor's 500, the Russell 2000 Index, and details on bonds, futures, and individual and institutional investments.

From the Professional area, you can access two useful sections: Business Management and Entre-preneurial/Small Business. These offer links to useful discussion forums as well as Demographics and Government Information, another important trends consideration. The amount of useful demographic material varies across the topics, but because you can scarcely track potential markets without demographic research, you'll immediately find these figures worthwhile.

From the main Finance area you can also get to Earnings/Economic Projections, which leads you to Census data, the Money Market Services' International Financial Reports, and the Institutional Brokers Estimate Survey. These have extremely useful material, but it comes at \$2 per report. And while you're online, don't forget the Financial and Professional formum, where you can discuss trends and other issues with experts and would-be experts. Check out the Investors' Forum for a sense of what to expect here.

Prodigy Spotting monetary trends through Prodigy is easy, although like diet food its great taste doesn't mask the fact that it's less filling. The Research button in the Business and Finance menu leads to several worthwhile trends-related screens, including one devoted specifically to economic indicators. You can access indicator statistics here for unemployment, factory orders, home sales and costs, retail sales, the trade deficit, and more. These indicators are presented clearly with some precise detail, and the accompanying text evaluint the issues further.

The CNBC Market area of Finance offers good charts and statistics, including quick-look charts that show the recent behavior of gold, Treasury bills, and the U.S. dollar. Pay particular attention to bond and futures activity: These are useful for spotting recent trends and acting on them. There are other methods of tracking trends on Prodiev, but these are the most significant.

Hives of Industry

You're already part of an industry. Where do you find instant and continual information about it and other industries you deal with? Newsletters, daily fax reports, and trade papers are your primary sources. But online you'll find excellent summaries of recent events in many different industries.

And where industry-wide analysis is lacking, details about specific companies pick up the slack. The Internet is particularly strong in this regard, as companies are vying to establish a strong presence to promote their ofterings.

The Internet Industry information is everywhere on the World Wide Web. But whatever you do, don't pass over Michigan's Economic Bulletin Board (Gophert ouna.hh.lib.umich.edu). This Gopher Ilms you to industry statistics, Industrial Sector Analysis reports, and International Market Insight reports. Furthermore, Best Market Reports offers extended commentary and statistics on specific industries. Gophering to gophert.own.hallog will put you in touch with the Securities and Exchange Commission's ETCXAR filines, includine dail was full index files.

To get an idea of how to track one industry in particular, check the high-tech industry at http:// www.industry/net/. This well-developed site puts you in touch with many aspects of the computer industry, including an archive of information and a free subscription to an industry report.

By far the most active and interesting industry information on the Net comes through the Clarical Net newsgroups, which cost additional monthives (determined by the service provider). You can subscribe by yourself for the standard rate of



IndustryNet I syour one stop shop for up-to-the-minute Information WWW IndustryNet: This Web site is a prime location for computer industry news, with links to industrial bulletin boards.

It hit us over lunch.

If we could order



the combo, maybe

we could

offer one.

Will that be regular?

Slimline Venturis 466

- Slimline easy-access enclosur
- 486DX2 66MHz
- 4MB RAM (exp. to 68MB)
 270MB hard drive (enhanced
- IDE on local bus)

 14" SVGA color monitor
- Integrated 32-bit S3™ Trio graphics accelerator with 1MB DRAM
 - Plug and Play ready
 - 3 ISA expansion slots (2 fullsize, 1 half-size)
 - 4 storage bays (2 ext., 2 int.)
 - 4 storage bays (2 ext., 2 int.,
 1 EPP/ECP parallel port
 - 2 buffered (16550) serial ports
 - 3.5" 1.44MB diskette drive
 - Multi-level security features
 - Desktop Management Interface-ready
 - Pre-installed MS-DOS[®] 6.22
 & Windows[™] for Workgroups 3.11

DECwriter 110i

- 3ppm output
- Money-saving ink cartridge
- Ink supply indicator light
 5 resident fonts
- Color upgrade option
- available

 2-year warranty

Combo Price \$1.867

Venturis 433sx

with printer shown \$1,665

Venturis 4100

Same specs as above, with 486DX4/100MHz CPU

with printer shown \$2,385



INTRODUCING DIGITAL PC-PRINTER COMBOS.

One does not live by PCs alone.

Or printers.

So we offer a wide variety of PC and printer combos that work like they're made for each other. And save you money, too.

The ones you see here are just the start.

As you'll soon see, we have plenty more

PCs and printers for you to choose from.

REGULAR COMBOS— FOR GENERAL OFFICE TASKS.

Venturis: We built this PC the way you would have, with the best of today's tested, proven-reliable technology.

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easy to buy-it's easy to live with, too.

Our on-screen "Getting Started" program makes set-up a breeze. And with its easy-access enclosure you can get inside without tools or having to disconnect peripherals.

DECuriter 110i: Do you have to pay a laser price to get laser quality?

Not here.

This ink-jet model delivers laser-sharp text at up to 3 pages per minute—and graphics that are up to twice as fast as its competitors.

Its insoluble ink won't smudge when wet. And the replaceable ink cartridge lets you save substantially on ink supplies.

Or deluxe?





Slimline Celebris 590

- Slimline easy-access enclosure 90MHz Pentium processor
- 8MB RAM (exp. to 128MB)
- 270MB hard drive (enhanced
- IDE on local bus)
- 14" SVGA color monitor Plug and Play ready
- Integrated 64-bit S3 864 PCI graphics accelerator with 1MB
- 256KB secondary cache (exp.
- to 512KB)
- 4 storage bays (2 ext., 2 int.)
- 3 slots (1 ISA, 1 PCI/ISA.
- 1 EPP/ECP parallel port,
- 3:5" 1.44MB diskette drive
- Multi-level security features Pre-installed MS-DOS 6.22 8/

DECuriter 500

- 5ppm output
- Money-saving ink cartridge Ink supply indicator light
- # 5 resident fonts
- Color upgrade option
- 2-year warranty

Combo Price

Same specs as above, with

Pentium 60MHz CPU

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What else can you get direct from Digital PC? Name it. Additional storage. Networking devices and applications. CD-ROM drives and multi-media kits. Most come preinstalled and ready to run when you order direct from Digital.

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Model	Processor	Price
433sx	486SX/33MHz	\$1,079
466	486DX2/66MHz	\$1,299
4100	486DX4/100MHz	\$1,799
	Celebris Slimline	
560	Pentium/60MHz	\$2,199
590	Pentium/90MHz	\$2,499

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IDE			

Upgrade to 540 IDE	\$399
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\$200			
\$700			
\$200			
\$700			

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PRINTERS

DEClaser™ 3500

- 12ppm print speed ■ 600x600 dpi resolution
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Can this laser printer do the job for the biggest power user - or a whole office of them? Why, yes, To keep productivity high, the DEClaser 3500 automatically switches between built-in PostScript and PCL5 languages, and works with PC, Mac™ and UNIX® systems. You

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 8ppm print speed 600x600 dpi resolution (true 1200 dpi optional)

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• 6MB memory (exp. to 66MB) 120 resident scalable fonts

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High quality. High speed, RISC processing. Low cost. Get all these for your small office or workgroup-along with optional Ethernet, Novell,* UNIX (TCP/IP) and Mac connectivity, and easy expandability.

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\$40 per month, but institutional/network fees are probably more sensible. See http://www.clarinet.com/index.html for additional information.

ClariNet newsgroups are professionally based, and if you need constantly updated details about industries and companies, ClariNet provides them. Some newsgroups deluge you, but when you really need to keep on top of things, a deluge is better than a drought.

America Online First stop: Business News. Updated frequently, this area lists nearly 30 separate directories, beginning with articles about the U.S. government, company actions, and company finance and ending with each major industry individually. Construction & Building, for example, offers articles on domestic and international construction issues. Other industries covered include media, retail, technology, telecommunications, transportation, and utilities. The articles feature trends, projections, and current issues involving the industries, and they offer a fast way to keep up with the latest news.

Next stop: The International Corporate forum is designed to bring together companies and investors. It offers conference information for major industries. You can even post questions to participating CEOs. Company details are also available from the Professionals forums. but not usually as a separate menu item.

CompuServe For instant gratification, try CompuServe's InvesText through the Earning/Economic Projections menu—but be prepared to pay. InvesText's full company and industry reports (as compiled by Wall Street firms) start at \$20 for ten report title searches and \$20 each for an additional ten. Once you retrieve a report title, you'll pay \$15 a page.

Prodigy Prodigy is less useful than the other services on industry details, but it makes up for this to some degree with its extensive company data. Several recovers are available from the Business and Finance are attrough the For Business button, including Dun & Bradstreet Solutions. A well-designed tutorial shows you how to conduct company searches, which can be based around industry criteria or focus on individual companies. As might be expected, these reports cost money: The first full report is \$5, with a sliding seale to \$1.50 gper report for more than 100.

The strongest industry-related area on Prodigy is Dow Joens Company News. From here you can access an area called Industry News, which gives you article after article from 14 categories. You can choose between headlines or full articles. A quick scan of the technology category on one particular day showed eight subcategories with stories dated as recently as the previous day. Another plus: The articles cost nothing extra.

DECISION MA	KER BEST BETS FOR FI	NDING INFORMATION ONL	INE
Choose the factor that's most important to you.	2 Choose the next most important factor.	3 What else is important?	For your needs, the best service to use is
	Cost	Avoiding Hidden Costs	Internet
Money	GOST	Low Startup Cost	America Online
Matters	Data Sources	Variety of Sources	Internet
	Data Sources	Portfolio Advice	CompuServe
	Cost	Search Usability	America Online
Trend Spotting		Avoiding Hidden Costs	Internet
ir ciru spotting	Data Sources	Variety of Sources	America Online
	Data Sources	Ease of Follow-Up	CompuServe
	Cost	Ease of Locating Information	America Online
Industry	0031	Ease of Follow-Up	CompuServe
Watching	Data Sources	Variety of Sources	Internet
		Usefulness of Sources	Internet

Do Business Online

Getting information online is one thing; running your business is quite another. For an online service to justify the added expense, it has to help you with your personnel, marketing, and sales needs. If you're satisfied with the way things are right now, you'll be better off not going online. Then again, when was the last time you were completely satisfied with your personnel, marketing, and sales? It just doesn't work that way, does it?

Doing business online takes resources, planning, and effort. It also takes commitment and, in the case of the Internet at least, a fair dollop of pioneering spirit. Online business is not just a venture but an adventure, and unless you're willing to treat it as such you might be better off waiting until all is tried and certain. But then, that's not the way you do things if you want to get ahead in business.

Human Resources

No matter how strong your current blend of personnel, you're always on the lookout for one or two perfect people to add to the mix. Traditionally, the way to find these people was by advertising in newspapers, recruiting from colleges and other institutions, even hiring a headhunter. All of this costs money, sometimes loss of it, so why not add another mechanism to your recruiting procedure that's perhaps just as focused and effective? Millions of poople use online services, and many of

May Note:

Cover Center Center

Cover Center

Resumes Online: Sift through job seekers with smart searches of Talent Bank in America Online's Career Center.

these people are intelligent, educated, and experienced in your field. If you know where to look, drawing up a short list online is often easier, faster, and more complete than through traditional sources. There's a growing number of online employment resources to choose from, and it's even possible to acquaint yourself with prospective employees through a volley of e-mail before that all-important first meeting. And it's usually an eccellent way to find workers. Several areas don't charge for job postings, and for a minimal cost you can join specific employment databases. Alternatively, you can search targeted fortums—college and university sites, professional forums, and so forth—to locate job seckers with the allent to take your business to new height.

The Internet Until recently, the Internet's human-resources benefits were only serendipitous. By using the Net, you more or less accidentally found out about people doing good work, made contact, and perhaps started the recruitment process. Today the Net offers a variety of employment locations, including several résumé posting areas. Still-active Gophers provide access to older resources, while the World Wide Web is quickly becoming every bit as important to job seckers and employers alike.

The most complete listing of employment-related resource Gophers can be found in Gopher-Jewels. Gopher to ewis, usc.edu, enter Other Gophers and Information Servers, then Gophers By Subject, Gopher-Jewels, and finally Business. This leads you to a huge list called Employment Opportunities and Resume Postings with more than 30 sites. Jobs are here in abundance, from the arts to the Defense Nuclear Facilities Safety Board. Spend a few hours searching through any of these and you'll get a good indication of who's looking for what kinds of people (you might also find a new career). And because many of the areas offer career). And because many of the areas offer



Shop Around: CompuServe's Business Professional forum (Go CIS:BUSINESS) is a hotbed of qualified job candidates.

résumé postings as well, you can discover potential employees easily. One of the best-known Gopher sites for this is the Online Career Center at garnet.msen.com. Here you can post or search for résumés and link to other employment databases.

The World Wide Web has several important employment sites. One of the glitziest is Career-Mosaic, found at http://www.careermosaic.com/. Designed for people who want to work in the computer industry, it promises a résumé posting service that you can use to find candidates. More impressive from an employer's standpoint is JobWeb-which is available at: http://www.risetime.com/ risetime /preview.html. This area is designed to allow companies to advertise positions and search résumés. Another winner is the E-Span Interactive Employment Network at http://www.espan-.com/, which offers separate sections for employers and job seekers, and a résumé database numbering in the hundreds. And for the latest wonder of the Web, visit the Monster Board (http://www.monster.com/). Despite its peculiar name, its huge array of employment material makes it a must-visit site.

Another important source of contacts on the Net is newsgroups. While some newsgroups have caused controversy over offensive and illegal postings, the fact remains that companies offer newsgroups and people try to locate jobs through them. Because it costs nothing to post your position to a newsgroup, why not try it? If you get just one good candidate, it's well worth the effort.

America Online To locate potential staff on America Online, start with the Career Center. This widely used area is oriented toward those seeking jobs rather than employers, but as with most such services it can be used by either parry quite profitably. Particularly useful from an employer's prespective is the Talent Bank, a database of online résumés that you can search according to keyword. Need a contractor? Type "contractor" in the search dialog box and watch the résumés appear onsereen. The same holds for any job category you may have in mind.

In addition, vou can post job descriptions at no extra cost in the Classifieds section under Professional Employment Offered. You can also view the classifieds for Professional Employment Sought, which you might examine before posting a job description. America Online even offers the E-Span and Help Wanted USA databases of available jobs, from which you can make contacts. And you can advertise your positions in both.

CompuServe On CompuServe, the forums provide some of the best access to potential hires. Through the Professional icon (or Go Professional), you can access forums in business management, data processing/MIS, media services, engineering, technology, health, legal, and other lines of work. Inside these areas are specific forums, such as the Broadcast Professionals forum (in Engineering/Technology), the PR and Marketing forum (in



WWW's Job Monster: Despite its garish name and appearance, The Monster Board is the career-search page of choice.

Entrepreneurial/Small Business), and the Photography Professionals forum (in Media Services). Once you get to a forum, enter the Library area and look for the item called Jobs or Member Profiles or whatever that forum chooses to call it. Here you'll find résumés and user profiles alore—and a place to publish your job listing.

Scavenger Hunt

We sent four PC Computing contributors and staffers to test the online waters. Here's a sampling of the kind of tasks they took on and how they fared. For more details, check out the table on page 140.

1. Financial data is everywhere online, but it's not easy to find. If you want to incorporate in Celaware, can you find flyow want to incorporate in acties conline? Only Rich Schwerin acties conline? Only Rich Schwerin will be seen to the seen of the seen of

2. How about sizing up your potential market? Not much luck here. One question we asked concerned the disposable income of 30-to 40-year-old males in a given state. Census databases didn't help much. Rich Schwerin's solution: "I'd soomer spend \$1,000 on demographic software."

3. Want to know about the profits in a given industry this year? Any online service that gives you access to Web sites can get you the answers—that is, if you know where you're looking. If you don't know the site address, you're better off with the Web Srover Lowers. Howard Baldwin's comment. "The Web has a beyor of company-specific and industry-specific information... somewhere."

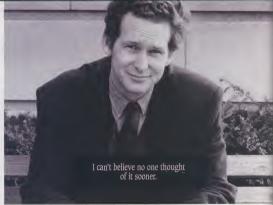
4. Looking to hire staff or consultants Zen of our scavenger hunters could find likely candidates for certain jobs by trawing various services. We sent them searching for various types of skilled workers, from civil engineers to NetWare engineers. Paul Friedman turned up the most-likely candidates on Compuser's 60 CCS-80 candidates on Compuser's 60 CCS-80 critical engineers) and GO CS-80 cPRBUM (for NetWare engineers).

5. Marketing questions are as diverse as markets themselves. When asked for information about marketing products and services in Pacific Rim countries. Paul Friedman got good results from CompuServe's GO CIS-TRADE and GO CIS-PACTRUM. Rich Schwier used WebCrawler's Boolean search capability to locate the Japan Technology Program (http://www.occ.gov/TP-Mosaic-marterials).

6. Cyberspace is a lot of things but shoppers' heaven it ain't. Although all the services provided virtual malls, the consensus was that mail-order businesses needn't fear.



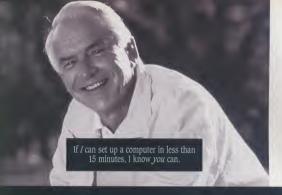
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computers easy.

OUT-OF-BOX EXPERIENCE

OOBE" (rhymes with ruby) stands for the "Out-Of-Box Experience." New from Acer, OOBE makes setting up a personal computer faster and easier than you ever imagined. Step-by-step, illustrated instructions. Clearly labeled packaging. Even a toll-free hotline to answer your questions.

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OOBE is available in Acer PCs from desktops to Pentiumprocessor multimedia minitowers. And it's waiting for you at your local Acer retailer.

"...a breeze to unpack. The large instruction sheet explained the assembly process easily."

PC Computing, Dec. 1994

"...A.C.E. Windows front end is one of the best around."

PC Magazine, Dec. 20, 1994

"OOBE is the Holy Grail..."

PC Magazine, Dec. 20, 1994





Human Resources

The Top Six Sites

The Online Career Center Gopher at garnet.msen.com features company profiles, detailed résumé listings, and employment assistance.

The up-andcoming Web site JobWeb (http://wwwrisetime.com/risetime/ preview.html) is an obvious source of recruitment information.

Seek out potential hires in America Online's Online Career Center—either keep an eye out for smart people in forums or search the Talent Bank.

CompuServe's
Professional area
(Go Professional) lets
you access any number
of specialty forums. The
Library area of each
forum stores résumés
from people with
relevant expertise.

Read postings on Prodigy's Careers Bulletin Board (Jump Careers) or post your vacancies by job type.

Prodigy's Classified Ada area (Jump Classifieds) is a well-used area with concise postings and an active readership. You'll pay for the posting, although not as much as you would in most newspapers.

CompuServe's training and specialty forums are worth a look too. The Computer Consultant's forum lists a wide range of specialists and gest you up to speed with assessing them. And within Information USA you'll find a Careers and Workplace area with job banks and links to areas dealing with training in specific careers—mot a beat alternative as a second-tier resource.

Prodigy The most immediate area on Prodigy for locating personnel is the Careers Bulletin Board (Jump Jobs to access this and others). Here you'll find discussions about a wide range of employment issues, but chief among them are postings of available jobs or, more frequently, postings from people looking for work. A more important area

for finding potential employees is the Classified Ads area (Jump Classifieds). Here you can place notices for 30 days at a cost of \$10 for the first page and \$1 per additional page. There are correspondingly higher rates if you want to make postings available for a loneer period of time.

As with the other services, following the special-interest and professional forums will bring you in touch with potentially suitable hires. In fact, because Prodigy's atmosphere is more evidently based on advertising and marketing, you can probably get away with postings that America Ohline and Compusers wisbestribers would find annoying and Internet users would consider a serious crime against humanity.

Ads and **Marketing**

Everyone needs all the help they can get to make people aware of their products and services. That 5 what makes online services attractive. They offer a built-in audience, have attracted more media attention than Roseanne Arnold, and many of your competitors haven't a clue how to exploit them.

Marketing and advertising require both commitment and ingenuity. The trick is to learn the services well by exploring the material available in topic areas, reading and participating in the online forums and chat areas, and getting a feel for where companies are advertising and how they're doing so. Blindly dumping e-mail messages into subscribers' mailboxes isn't the answer. Those who try experience flames enough to barbecue the credibility of their businesses to a risp. If you believe that any publicity is good, fair enough. If you don't—you're right. However, if you know your audience, there's room for effective marketing and advertising on any service, and there's room to be creative about it.

The Internet Forget what you've heard—the Internet is no longer unsallied by the taint of commercialism. Through organizations such as the Commercial Internet Exchange, it is now entirely permissible to use the Net for marketing, advertising, even sales. But this isn't to say that the gates have been thrown wide open. If you post ads to a newsgroup that doesn't unvite them, you'll be flamed so badly you won't know what hit you. However, the World Wide Web is developing a very strong business focus, and this might very well be the loader for you to begin.

How do you adventise on the Web? A number of options are available, and it's not necessarily an expensive thing to do. Essentially you need a Web presence, which means that you need a site Web users can get to all times, 24 hours a day. You can do this through a complex sequence of establishing a server with its own high-speed lines to the Internet (about \$20,000 in startup fees and \$500 to \$5,000 per month). Alternatively, you can rent space on a service provider's machine for somewhere between \$50 and \$1,000 per month, with a setup and design fee of \$2,000 to \$5,000. If you there an employee who can write Web pages, this rate dwindles. If not, it's usually cheaper to bring in a contractor.

To get an idea of how much advertising on the Web costs and how to go about it, see the list of Web space providers at http://www.directory-.net/dir/servers.html. From here, click on any of

A review

An ad will be displayed on the that follows.

To move forward through ads, at a time, select INEXTI.
To step back through ads you previously seen, select IBRCKI.
If you see an ad that interes select [LOOKI.

When you are finished LOOK

But They're Everywhere! Prodigy's Ad Review lets you view all of the ads that are posted on the service at that particular time.

COREL DRAW! 5

The Best in Graphics and Publishing



Circle 230 on reader service card.

-613-728-0526 ort 3000 De

Super Market

The Top Six Sites

The Commercial Sites Listing (http://www.directory/com/) provides you with Web pages to emulate.

The INET-Marketing malling list (inet-marketing@ einet.net) contains lively discussions about all aspects of marketing and advertising on the Internet. Expect as many as 20 messages daily, with a good hit rate of useful ones.

America Online's main menu is your first stop for marketing and advertising opportunities. Enter the various areas and see how others are developing a presence.

4 CompuServe's
Shopping area (Go
Shopping) features not
only online ordering but
also online marketing
and advertising.

5 Prodigy's automobile showcase (Jump Autos) is worth visiting for examples of marketing online without sales online. You can advertise directly on this cover page.

6 Prodigy is an ad showcase. If you want to get a quick response, have your ad displayed on start-up and offer a button to let users see more

the links to see what they offer for Web advertising or marketing. For example, the A pollo Advertising site at http://apollo.co.ud/ offers a list of the advantages of Internet advertising: This is an unusual site in that advertising is free, showing up on the Web much like classified ads. By contrast, Home Pages provide commercial space based on number of accesses and size of site. See http://wwwspace-homepages.com/ for details. Moving into an Internet "mall" such as Downtown Anywhere (http://www.awa.com/) means negotiating a fee based on your individual needs, while many providers offer extensive lists of possible configurations.

Finally, there's the question of how to present yourself on the Net. Remember thay you don't have to reinvent the wheel. Fire up the Commercial Sites page at https://www.directory.net' and browse until you find something you like. Capture the Web page as a I TyperText Markup Language (HTML) file by selecting the View Source or equivalent command on your browser, then start revising. Or get someone to do if or you. Several firms on the Web offer HTML authoring as part of their Web site package, but since HTML is hardly rocket science, it will be well worth your while to hire or train someone within your company to design pages.

Once you have the ad in place, you have to get the word out. There are several places on the Net to do this. Start with the Commercial Sites list (http://www.directory/com/), which offers specific details on how to post a new entry. Another natural is the What's New on the Web page (http://www.nesa.uiu.ecd/SDG/Software/Mosaic/Docs/whats-new.html), an extremely oppular—and frequently updated—site for Web users. As you become proficient on the Internet, you'll discover newsgroups and mailing lists that univie announcements of this type. Do not, however, simply post your ad blindly unless you want to incur the wrath of thousands of Net users.



Focused Marketing: Any of the areas on America Online can be helpful in supporting your marketing and advertising efforts.

America Online On America Online, start with Clubs & Interests from the main menu, then try Travel, Entertainment, Computing, and other topics. The strategy here is to establish an information area of your own within these subcategories, which is much the same as setting up a storefront in the MarketPlace (see "Doing Business," page 135). Alternatively, you can explore the forums in these



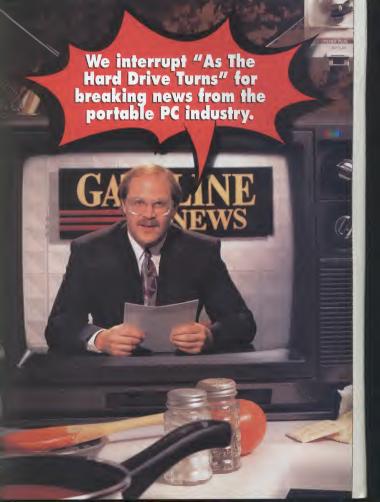
Credit Club: Visa's recent forays on the World Wide Web are a good example of how to advertise and market a company online.

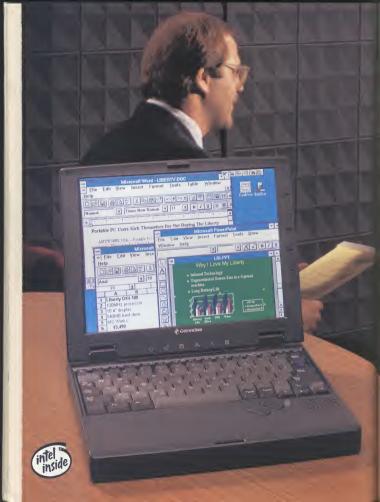
topic areas and establish a presence as a knowledgeable contributor in those related to your company's offerings. This will work as a public relations move by establishing your firm's name in the minds of the readers, and give you the opportunity to do some impromptu name-dropping about your products. You can also use these forums to establish mailing lists, and branch our later by developing your own forums to discuss your offerings.

CompuServe To market products and services inexpensively, give CompuServe's forums a whirl. Establish a forum of your own within a particular profession, hobby, or entertainment area, or browse the forums and respond to questions about available products with brief descriptions of what your firm has to offer. As with the Internet and America Online, doing this takes a fair bit of time because you need to understand each forum and its needs before aching the plungs.

A lower-maintenance marketing arena is the Shopping area. You don't have to set up an online store here. Instead, you can use the area to advertise and market your products, providing everything from free brochures and catalogs to online graphics designed to attract customers. It's expensive, but the audience you reach may make it worthwhile.

Prodigy When it comes to advertising, Prodigy is different from the other online services. Ads are on every Prodigy page, changing as you move from area to area and page to page. Prodigy is the most marketing-friendly service. There's even a







Reporter: We have an exclusive interview today with a person who wishes to be identified only as John Doe. Now tell me John, is it true you purchased a portable PC from one of those "other" companies?

John Doe: Yes sir, I'm afraid it is. I'm so foolish. I settled for a portable PC with a tiny 8.4-inch screen, a 250MB hard drive and minimum software applications. It sounded good at the time, but that was before I knew about the 4.2-pound Liberty" from Gateway 2000. Its impressive 10.4-inch screen has 53 percent more active viewing area than the 8.4-inch screen and it features amazing infrared technology that lets you use many cool IR features including wireless transfer. I'll still be transferring files with those darn cables while Liberty users can simply beam files back and forth between their desktop PC or another Liberty. Plus, the Liberty DX4-100 Best Buy has a powerful 100MHz processor combined with a massive 720MB removable hard drive, 24MB R.M., a TelePath" 14.4 XJACK. fax/modem,

leather carrying ease and Microsoft* Office Professional. How could I have been such a sap? I relish the thought of having a Liberty for about the same price. Now I have to enroll in the Portable PC Protection Program and start a new life. If only I had gotten the Liberty from Gateway 2000!

Reporter: Well, there you have it. This is just one of many portable PC buyers distraught because they bought a PC from one of the "other" companies. Remember, the Liberty is the latest and greatest development in portable computing. Unless you want to end up like this poor fellow, don't settle for anything less than a Liberty from Gateway 2000. Call them today! We now return to "As The Hard Drive Turns."



The Exclusive Story In Portable PCs!



Gateway 2000's new portable PCs - the Liberty and ColorBook



GATEWAY 2000® LIBERTY

- 4.2 l.bs. 10" x 8" x 1.6" ■ 10.4" DSTN Color Display
- 1MB Video RAM
- Infrared Capability ■ Intel® 486 DX2 or DX4 Processor
- Instant On
- NiMH Battery & AC Pack ■ 2 PCMCIA Type II Slots
- EZ Point™ Integrated Pointer
- Removable Hard Drive ■ 78-Key Keyboard ■ Parallel, Serial, VGA & PS/2®
- MS-DOS® 6.22 & WFW 3.11 ■ Microsoft® Works for Windows™ 3.0 or MS Office

Professional 4.3** **MS Office Professional 4.3 includes Word, Excel, PowerPoint® presentation graphics program, and Access³ database.

LIBERTY DX2-50

10.4" Dual-Scan STN Color Display, 8MB RAM, 340MB HD, MS Works

\$2799

LIBERTY DX4-100

10.4" Dual-Scan STN Color Display, 8MB RAM, 540MB HD,

MS Works \$3490

LIBERTY DX4-100

Best Buy 10.4" Dual-Scan STN Color Display, 24MB RAM, 720MB HD, TelePath™ 14.4 XJACK® Fax/ Modem, Leather Carrying Case, MS Office Professional 4.3**

LIBERTY PROFESSIONAL PACK

MS Office Professional 4.3, PCMCIA TelePath XJACK 14.4 Fax/

COLORBOOK2TM

5.7 Lbs. 11.65" x 8.5" x 1.77" ■ 10.3" DSTN Color Display

- Intel 486 DX2 or DX4 Processor ■ 8MB RAM (Expandable to.)
- 1 5MB Video RAM (includes) 512KB cache)
- Removable Hard Drive
- 3.5" Diskette Drive ■ Integrated 16-Bit Sound and
- Speaker ■ NiMH Battery & AC Pack
- EZ Point Integrated Pointer
- 2 PCMCIA Type II Slots ■ 85-Key Keyboard
- Parallel, Serial, VGA & PS/2 ■ Padded Carrying Case
- MS-DOS 6.22 & WFW 3.11 ■ Microsoft Office Professional 4.3**

COLORBOOK2 DX2-50

Deluxe 8MB RAM, 540MB HD, TelePath 14.4 Fax/Modem, Carrying Case, MS Office Professional 4.3**

\$3499

COLORBOOK2 DX4-100

Deluxe 8MB RAM, 720MB HD, TelePath 14.4 Fax/Modem, Carrying Case

MS Office Professional 4.3** \$3999

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separate Ads page users can turn to (Jump Ads) when they want to see what's being offered without jumping through every service.

Prodigy's inclusion of ads in the topic lists is a potential gold mine. The Jump command (which helps users find keyword-based topics) opens a window of choices, and frequently one or more are labeled "ads," while others are labeled "shop" (for shopping areas). While this is different from magazine or newspaper ads, it might be more effective. Users choose to see the ads, which means they're afready in the mood to see what you have to offer.

Doing **Business**

The Top Six Sites

Tentrepreneurs on the Web (http://sashimi.wwa.com/~notime/eotw/ EOTW.html) offers a place to locate businesses

Interesting
Business Sites on
the World Wide Web
(http://www.rpi.edu/
~okeefe/rpi.gif) is a
one-stop site to explore
ways to set up sales and
service on the Net.

America Online's
Marketplace is
wide open for new
development. If you're
looking to establish an
online presence, look
here. If you're a
cataloger, try the
2Market area instead

CompuServe's
Electronic Mall (Go
Mall) is the most fully
developed mall of any
online service

CompuServe's Electronic Mall features a special section for vendors who ship outside the United States (Go SM-41), including extensive listings for Canada and Japan. If you ship internationally, consider this option.

6 Prodigy's Jump Shopping is a must-see area for online commerce ideas. Check out JCPenney's catalog for inspiration.

Doing Business

When it comes right down to it, you have to generate sales, then support those sales with customer service. CompuServe boasts over 2 million users; America Online and Prodigy kick in at over 1 million cach, and the Internet is up around 20 million, with predictions of 100 million or more by decade's end. Can you afford to ignore a group whose participation online proves they have spending power?

As a sales area, the online networks are best for niche products or specialty services, especially those aimed at the high-tech industry. But financial and legal services are making their way online, so the concept of a niche market is losing its value.

Many reputable firms use online services for customer support. Hewlett-Packard, Microsoft, Digital Equipment Corp., and others offer interim upgrades, bug fixes, new drivers, and technical documents on the major services. This support may not create revenues, but it can reduce support calls and enourage sales.

Becoming a vendor on the commercial online services is more expensive than renting space on an Internet-connected server. But commercial services give you solid demographic information (something the Net cannot provide, though the students who traditionally populate the Net are themselves a targetable demographic group), and the commercial services know about sales volumes. They have a fully secure system for credit eard purchasing and offer online promotion and built-in marketing.

One thing to keep in mind online, especially on the Internet, is to update your site often. If you want users to return to your offerings, you'll have to provide them with a reason for doing so.

The Internet What's on sale on the Net? Pick from more than 1,000 commercial sites on the World Wide Web's Commercial Sites listing at http://www.directory.net/. A few hours of browsing will teach volumes. From the legal offerings of Venable, Bactjer, Howard & Civiletti (http://wenable.com/vlk/hcmi) through the product offerings of Computer Express (http://exapress.com.2700/), you'll find something to emulate or avoid.

How do you trade? There are two ways: One is to have users fill out froms with purchase details, credit card information, and so on, and submit these online. The other is to offer online information but offline transactions—in other words, users call a toll-free number to order the goods or they establish an account with you over the phone and their online orders are then charged to that account.

online orders are time transget to that accounts. The problem with selling over the Internet is security. Data is routed and rerouted any number of times during a transmission, which means it can be stolen. Several encryption technologies address this. BSA encryption enjoys the current lead—Netscape Communications, developer of the popular Netscape browser, uses it—and by the time you read this secure transactions should be possible.

For customer service options, browse the offerings by the big companies. Hewlett-Packard (http://www.hp.com/) Cary Research (http://www.yc.orm/), Silicon Graphies (http://www.yc.orm/), The Santa Carz Operation (http://www.yc.orm/), The Santa Carz Operation (http://www.yc.orm/), as will. The computer (http://www.yc.orm/) as will. These offer an excellent idea of how to construct a full and effective technical and cleint service size.



Let 1,000 Flowers Bloom: This Prodigy marketer offers splashy color, product photography, and credit card ordering.

Waiting for the green light

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IRobotics

The cost to set up a sales or service site i similar to that of a marketing or advertising site. In fact, it's all part of the same site. Forms, graphics, and extensive documents drive up your overhead (space rents at about a monthly rate of \$1 per megalyte), so expect a full service and sales site to run between \$300 and \$3,000 per month, perhaps even more. The good news is that you should start to see results within weeks of posting the site and making the Net aware it exists.

America Online If this is your service of choice, log on, choose Keyword from the Go To menu, and type a keyword. In the dialog box, type Greenhouse. This will demonstrate the commitment America Online has to developing its rather sparse MarketPlace.

Until December 30, 1994, America Online offered assistance for exceptionally creative entrepreneurs to establish a presence in the MarketPlace. While Greenhouse is no longer available as such, you'll discover some of what you need to know, especially America Online's forward-looking attitude in online sales. To become a vendorf, however, you need to contact America Online at (703) 448-8700. At that point, you will enter a unique arrangement with America Online in which there are no standard packages or fees.

CompuServe The standard rate on CompuServe is \$20,000 annually plus 2 percent of online sales. This

fee gives you access to 2.5 million CompuServe members and full online promotion by the service. It lets you list up to 100 products with descriptions, 25 of which can have high-resolution images. To market in CompuServe magazine or on their CD-ROM costs extra, and your best bet is to call (614) 457-8600 to cut a deal. Incidentally, nearly 90 percent of vendors renew their CompuServe contracts, so something must be working.

CompuServe has the most fully developed online mall of the three commercial services. You can't buy a car over the wires, but you can order flowers and electronics items, plus computer hardware and software.

Prodigy The shopping area in Prodigy is attractive, colorful, and well designed. Your customers can see digitized photographs of your products and order via credit card. But Prodigy's store services are expensive. Offering a downloadable catalog costs \$4,500 to set up plus a minimum of \$1,000 per month (\$2 per catalog downloadabl.) A catalog with an order form costs \$7,500 to establish, the same \$2 fee as before, and \$15 percent of all sales placed over Prodigy for a minimum of \$3,000 per month. Stores with products cost between \$18,000 and \$22,000 to build (with several options available), plus a monthly fee to be negotiated separately with Prodigy. To become a Prodigy roan fall colline Commercial Marketing at (800) 776-3449.

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Scavenger Hunt

Every month, slackers and trivia buffs scour the Internet on a funand-games scavenger hunt. Not so the participants in *PC Computing*'s online expedition. We sent our cyberspace squad out into the online world to find solid information—data that could make a difference to a business.

There were four participants. Paul Friedman, vice president of technology for data analysts National Benefit Resources and a PC Contact sysop, trawled CompuServe. Rich Schwerin, editor of PC Computing's I-Way Patrol, untangled the Internet web. PC Computing Senior Editor Howard Baldwin hooked up to America Online. And author Neil Randall took on Prodigy.

The quest: To answer tough questions businesses need answers to. Check out the "Scavenger Hunt" sidebars on pages 115 and 125 for details.

The results: Read on to learn how easily our intrepid online pilgrims found answers and how they rated the information once they found it. In some cases, online was the place to be. But in others, as Paul Friedman says, "Calling the public library would have yielded information faster."

Task	Best Sites	Completeness
Find It: Financial information —from tax tables to exchange rates. Sample Questions: What's the U.S./Canadian exchange rate? What's the best loan rate you can find? Where did IBM close on the Nikkei?	First Place: CompuServe: GO QUOTES Runner Up: America Online Personal Finance	More than 70 percent complete in 15 minutes.
Find It: Market trends that early business adopters can exploit. Sample Question: What is the disposable income of 30-year-old males in Northern California?	First Place: Internet Gopher.census.gov	60 percent complete in 10 minutes.
Find It: Industry inside information to fuel your competitiveness. Sample Question: What were the profits of Hewlett-Packard in the last quarter?	First Place: Internet quote.com and individual company Web pages	70 percent complete in 30 minutes.
Do it: Find good staff online and train them. Sample Questions: Where can I post my résumé online? Where can I locate civil engineering graduates for here in the next quarter?	First Place: Compuserve. GO Compuserve. GO CISINDEX and a word or phrase for the job. for engineers, GO CISISABETYNET and GO CISISEAP. NetWere engineers GO CISISAP. NetWere engineers GO CISISAP. NetWere complication of the complete of the	60 percent complete in less than 30 minutes.
Do It: Market your product online or leverage online resources. Sample Question: Where can I advertise products online?	First Place: Prodigy: Advertising is everywhere, D&B Online. Runner Up: CompuServe GO CIS: TRADE for the International trade forum (GO CIS:Classified for advertising).	More than 60 percent complete in 30 minutes.
Do it: Conduct business over the wires. Sample Questions: Can I buy office furniture online? Where can I find network printer distributors?	First Place: America Online, (Keyword: Marketplace)	100 percent complete in 15 minutes.

USABILITY INFORMATION

Satisfaction	Resources Used	Comments	Verdict
"The forums available cover just about every topic imaginable." PF	Using CompuServe to Make You Rich by Terry Detrumann and Susan Futterman (1994, The Watte Group Press)	"Some of the resources are surcharged reasonably, some are too expensive." PF "Is that Canadian\$1.37 to U.S.\$1 or v/ce versa?" HB	"Lignored the high-priced stuff; S0.015 a lookup I can afford." PF
"Less of a net surf, more of a pleasure cruise." RS	"My trump cards: a shared T1 connection and WebCrawler (fromhttp://www/bio/tech/ washington edu/WebCrawler/ WebQuery.html)," RS	"Fast, but I might eventually want more specific and tailored information." RS	"Researching gender ratios and age breakdowns on a county-by-county basis is handy. I'll definitely sell more widgets in Peoria." RS
"There has to be a cheaper way! I didn't find everything J wanted. Commercial services are better—you pay more, but you get exactly what you want quickly." RS	The Internet Business Book, by Jill and Metthew Elsworth (1994, John Wiley)	"Very handy if the company you need information on is traded publicly; private companies are tougher eggs to crack." RS "You can order HP's annual report online, but it comes by snail mail." RS	"It's getting better all the time— you'll be able to access even more specific data by the time you read this." RS
"With more time and a greater willingness to enter the surcharged areas, I know I could have found more." PF	"Asking fellow members questions is my No. 1 resource." PF	"When I need information, I need it fast. I couldn't make use of the greatest resource on CIS and ZNT; asking questions on the forums." PF	"Hang around forums and you will have no problem finding personnel. You will also learn many new and exciting TLAs (three-letter acronyms)." PF
"I'd like to call the service to find out more." NR	None needed.	"Offering up commercials is a no-no in forums, but being helpful is a great way to build a customer base. Forum regulars spread the word." PF	"There's no direct way of doing this." NR
"Pretty satisfied, but I'd like to know how the others are doing." HB	For America Online: "Didn't touch 'em." HB	"You have to know the products; you have no idea what you're buying." HB	"If you're buying, stick to the catalogs." HB
	For the Internet: O'Reilley's Global Network Navigator	"The Web's digital commerce continues to grow by leaps and bounds, but nothing beats buying direct." RS	

PC COMPUTING 141

Online? It'z Not **Ze Same**

t was time for me to go online. I'd resisted for years. Despite the access to a global library and a chance to participate in international forums, I held back. There's something that I love about talking that you don't get with online keyboard chat.



For one thing, you can't whisper, yell, whiste, or do accents. Sure, you can write, "He whispered," or phoneticize dialects: "Ver iz de votka buttle, Hanz?" But it's not ze same. Impressionists like Rich Little would have a hard time demonstrating their skills online. And the potential for fraud online is enormous. With everyone reduced to flashing fonts, you don't have any idea exactly who it is you're talking to. Let's say you're about to oleas big deal, then

ind out the stats and figures you got online were actually created by a 14-year-old hacker in Sarasota, Florida. Hiring employees via an online service could be equally dangerous. You put out a message that you need someone who's an anthropologist and a musician for a dig and gig tour of the world. You choose the perfect candidate, only to find out that his bogus résumé was created by a 15-year-old from Sheboyaga, Wisconsin.

Despite my paranoia, I made

reduced to
FLASHING FONTS,
you don't have
any idea EXACTLY
WHO you're
talking to.

really wasn't expecting to find anything useful as I searched the Net for interesting data. Boy, was I surplied when I found a service that, offered me pit to I million digits and this was just my first day. On the second day I found another posting that gave me pit to 1.25 million digits. I was really making progress. My fears seemed totally unwarranted. I found services with information about sourdough recipes, bondage, Aleister Crowley, pagan rituals, tax law, and postcard collections. I was really moving now. The jargon was happening. Gopher, Veronica, Jughead, coke service, finger service—everything was falling into place.

Then I saw the posting: "Newnet. Go beyond

online. Dr. Bug," I was fascinated, did some research, sent some e-mail, and was invited by Dr. Bug to attend one of his classes on "going beyond the Net" at a local university. Two weeks later, I was there in a room filled with students waiting for Dr. Bug to enter. And when he did, I was shocked. I turned to the person next to me. "The guy's a lippin' insect," I said.

"Yeah, shut up and let him talk, will ya?"
For an hour and a half Dr. Bug spoke lequently about how the online services are just a rip-off of what he called the "Inscenter"—the way insects have been communicating for millions of years—and how there's an incredible library of historical and genetic information that will soon be made available through online services. The Insectnet, he claimed, had tie-ins oan intergalactic network of cosmic information. Of course, there was a feet to get on, but it seemed worth it and much more interesting than sourdough recipes.

The class let out, and I went up and asked Dr. Bug how I could get onto the Insectnet. He told me it would be some time before the hardware was complete.

"That's the problem with you humans. You need to build hardware," he said. "As you can see, our antennae and processors are all built in. You've got opposable thumbs. We've got built-in hardware. It's a trade-off, but there is a way. Give me \$500."

I gave him the money, and he gave me a strange bottle of shampoo. I dashed home and washed my hair, making sure to follow the specific instructions on the bottle of shampoo. One week later, I had antennae buds bursting from the top of my scalp. I knew then that I would soon be surfing the files on the Insectnet.

I've gotta go now. I'll buzz you later. I've got to get back to the hive. My queen needs me.

CHARLES FLEISCHER is a Los Angeles-based comedian who still thinks surfing requires a beach, a soundtrack by Brian Wilson, and a board.



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SYNOPSIS

TABLE FOR TWO: Database building blocks. 148

FOREIGN AFFAIR: Import external data, 149

FUNCTIONAL FORMS: Data entry elegance, 150

QUERIES TO GO: Get data from the source, 154

REPORT CARD: Combine data cleanly, 158

CUSTOMS DECLARATION: Menu please. 166

USABILITY WINNER: End users and power users love one 168

EXPERT HANDS: How the pros do it. 170

FNGINES ROARING: Who performs best? 172

FINAL ANALYSIS: Pick your winner. 174

ou're finally unplugged—you don't rely on a mainframe database for life support any more. You can choose from a handful of PC databases. that should make departmental data access and application development as easy as all your other Windows applications. But are they really that easy? Combining the power of

databases with the ease of Windows seems like a sure way to make your users ecstatic and your application backlog extinct. The question is, are Windows databases practical or problematic?

Building a Windows database presents software developers with a unique challenge. It needs to be powerful enough for developers to build robust applications. But it also must be easy enough for end users who may not know database fields from Mrs. Fields.

To try to find the most suitable database, PC Computing evaluated Windows databases from the top software vendors in our Usability Labs: Borland International's dBASE for Windows and Paradox, Lotus Development's Approach, and Microsoft's Access and FoxPro. We sent two groups through our usability tests: power users, defined by their breadth and depth of database experience, and end users, who had more limited experience.

In our quest for backup data, we also ran the databases through some rigorous performance testing. Just for fun, we also invited the software vendors to send their best developers into our Usability Labs for a day. See "In Expert Hands" (page 170) for a look at what the very best can do in crunch time.

We suspected that a database that didn't require programming knowledge would be a big hit with end users, and it was. But guess what? The power users loved the simplicity of point-andclick too. The combination of Windows' ease with databases may still have some kinks to work out, but if you're searching for a database for all of your users, good news follows.

BY YAEL LI-RON AND JOHN MONTGOMERY

POWER USERS' ACCESS: Surprisethey all praised the Table

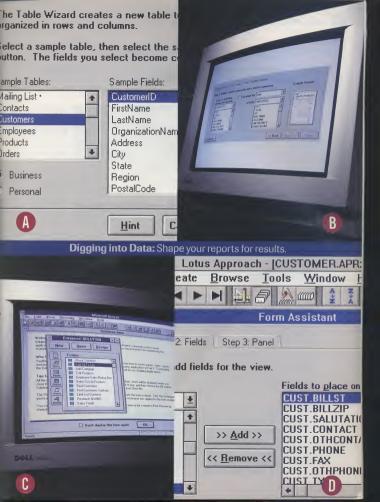
Wizard as a useful tool. POWER USERS' APPROACH: None of them missed cryptic

codes when presented with the more usable interactive environments. END USERS'

ACCESS: They loved the way the catalog feature consolidates information and gives them easy access to related files.

END USERS' APPROACH: It's hard to imagine how they ever created reports without built-in assistants

146



All Users: Arranging Tables

The applications that did best were the ones that gave a helping hand in the initial stages of building a database. Look for built-in aids that help you build tables right up front. These Wizards, Assistants,

and Experts slice the time it takes to get interim results good enough for colleagues' feedback.



FoxPro: If you think of FoxPro as a power user's database, think again. In the most basic task—creating a table—it was the favorite thanks to its intelligent Table Wizard You'll find the same shortcut in Access too.



dBASE: Table creation is easy with drop-down lists. Users found the way dBASE walked them through the steps was better than using online help.

Creating A Table

Paradox categorizes fields into several types.
A field type determines the kind of data you can enter in a field. Number, Alpha, and Money are field types.

350.20 Product ID is Number, so it accepts only numbers.

Libeau Product Name is Alpha, it

Paradox: Coaches are a welcome addition to the complex system of online Help and Experts. The Script
How We Tested
Arranging Tables
We asked our testers to
create a table based on
a list of names and
addresses. Then we had
them modify it to include
a field for an Internet
e-mail address.

Lab Notes
What Our Testers
Said about
Arranging Tables
"I didn't like the fact that
the field names (in dBASE)
were limited in length."
PROPERTY

table was straightforward using the Catalog Manager and the Wizard." SEMICONDUCTOR EQUIPMENT MECHANIC

"Defining the [FoxPro]

Table Talk

Information is flowing into your organization at an exasperating rate, and only a new database will give you any hope of managing it all. But where do you start? At the heart of any database lies a field struct, a place where you can insert information. Attis simplest, it's a table of rows and columns. But before you can enter data into the table, you must design it to include all the pertinent fields. We asked our testers to create a table, then modify the table's structure to include an additional field. Sound easy structure to include an additional field. Sound easy

Curiously enough, Lotus's Approach, our overall usability winner, wasn't as well received.

Our testers praised the straightforward interface of Microsoft's FoxPro—especially the Table Wizard that guides you through the table creation phase. They credited the interface with the success of the operation. Some complained about fields being limited to ten characters (an anachronism we can thank dBASE for), but this was a minor weakness.

Creating a table was easy in both Microsoft's Access and Borland's Paradox. Our testers liked Paradox's Coach; it's a step up from an Expert in that it works with data you already have to build what you need.

SUMMARY					
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Simple and straightforward.	Not quite there.	Delivers on its promise.	Best overall.	Smooth sailing.
Productivity	Perfect score.	Very impressive.	A regular power tool.	Doesn't get any better than this.	Users were impressed.
Help System	Satisfactory.	Painfully lacking.	Needs help.	Less than satisfactory.	Usable but lacking.
Summary	****	***1/2	****	****5	****

All Users: Importing Data

Chances are you already have all the data you need—it's just stored in places you can't get to very easily. All you have to do is import it from an existing file to populate your database. Too bad it's not always

that simple. Approach has made The Script the process so streamlined, its competitors should take note. Tide.

How We Tested Importing Data We asked our usability testers to take information we provided in comma- and tab-delimited text files and add it to a table that they had already created

Lab Notes What Our Testers Said about Importing Data "After endless slogging through (FoxPro's) manual. Lgot as far as finding the process, but the description seemed to start somewhere in the middle." COMPUTER

"I was really impressed with (Approach's) field assignment dialog box." TECHNICAL SUPPORT ENGINEER



FoxPro: Many testers failed to get FoxPro to import their data. The documentation gives no clues.



dBASE: Contrary to common sense. File, Import doesn't import data-it's only for importing spreadsheets.



Approach: Our testers found Approach's data import tools to be the best of this group. Clicking on "Import options" lets you add data as new records, import data to update existing records, or do both simultaneously.

Import Duties

What good is a database without any data? But where do you get the data? Unless you feel like typing in a few thousand records, the answer is probably some kind of file that already exists. We asked both our power users and end users to pull information from a comma-delimited file (in which the fields of information are separated by commas) into each of the five database programs. If you're trying to take advantage of old data and a new database, this is a crucial step. The result was a hands-down usability win for Approach. Our testers praised it highly, citing data import as its best feature. When it imported text, it lined up the data in the proper fields smoothly-with no guesswork about matching text to fields. Another reason for its popularity: a well-designed online help system led users directly down the right path.

All of the others earned poor overall marks for data import. Even with its new Windows version, testers found the dBASE for Windows interface downright unfriendly; a third of them couldn't even finish the data import task. Testers' reactions to Paradox were similar: Overall, it was a hassle, and the online help provided no guidance.

SUMMARY		-	COL.		40 mm
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	An experience not to be repeated.	Power user heaven.	Less friendly than a grizzly.	Don't bring it home to mom.	Not for the inexpenenced.
Productivity	Appending data is confusing.	Perfect.	File, Import doesn't work for data.	Append not Import is confusing.	Odd file formats cause problems
Help System	Hints sometimes cryptic.	Help is explicit.	Occumentation has errors.	Slog through those manuals.	Helpful for advanced users.
Summary	**1/2	****%	**1/2	**	**

*****Excellent **** Good *** Acceptable **Poor * Unacceptable

End Users: Creating Forms

It's not often that we see perfect scores in our Usability Labs, but this time Microsoft's Access shone with glowing reviews and a perfect five-star rating. Overall, though, this category is a strong suit for

each of the applications.



Access: Creating professional-looking forms (or screens) is made possible with custom controls from the floating toolbar. You can add any object to your screen, from radio buttons to check-off boxes to charts.



dBASE: The Form Expert shows the results of your different selections in a preview screen, so you can be sure that the colors don't clash and the text stands out just right.



FoxPro: Creating VCRstyle buttons on your form with this Screen Wizard is as easy as selecting a picture button. Add some special effects to the fields on the screen, and your professional-looking screen is ready. The Script
How We Tested
Creating Forms
Our usability testers were
presented with a hardcopy facsimile of what
the form was to look like,
and were instructed to
use any tool available to
create that screen.

Lab Notes
What Our Testers
Said about
Creating Forms
"The [Access] Form
Wizard led me through
the process with no
problems at all."

PROPERTY MANAGER

"Having designed a form manually, I found this difficult. But the [Paradox] Form Expert made it easy."

SYSTEM

Form Functions

The value of Windows, of course, is its intuitive interface. That's especially important when you have a custom-built database application that will give users the ability to input data in the easiest and most efficient way. All of the databases we tested offer tools for building forms (or data-entry screens). You may think of form-building as a task strictly for power users, but that's changed—end users can now create professional-looking forms with all the necessary muscle. This assignment went smoothly have the same professional continued to the continued of the same professional continued to the continued to the same professional cont

all of our end-user testers, with only a few glitches.

Creating a form in Microsoft's Access is as simple as interacting with the built-in Wizard, Microsoft's utility for creating something complex by posing simple questions to the user. Based on the answers, the Wizard handles both aesthetics and function. It draws the screen, then lays out the specified fields. Users can then tweak the results to fit their needs.

The other four programs were all second among equals. Like most Microsoft products, FoxPro also has a powerful Wizard and although it's targeted more toward power users than end users, our testers praised the resulting interface for its elegance.

SUMMARY					
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Our testers praised it highly.	Smooth sailing.	Nice and easy once underway.	Only slightly lacking.	Easy street.
Productivity	A painless process.	A cinch, said users.	Impressive.	A few missteps but good results.	Easy and almost always friendly.
Help System	No one needed to access it.	Could do better.	Very helpful for most testers.	Best overall.	High marks.
Summary	****	****	****	****	****

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Power Users: Creating Forms

Power users didn't fare too well in this task, mostly because all of the applications insist that the queries to be built must be determined prior to the creation of forms, which is not when it's most convenient for the person building the form. Even though Approach

Access: If you don't select a table or query prior to running the Form Wizard, you get this error message. It would be better if it took you to a "browse" screen so that you can





was again the leader, satisfaction

with the results overall wasn't high.

Paradox: Rather than leave the user hanging, why can't this error message make suggestions or explain the problem in more detail? Send help!

Checkbox Label Create Checkboxes from Field Data

Approach: When you need to assign values to checkboxes, just fill in the values in this table-no IFs. ENDIFs, or BUTs. A similar routine in any of the other databases would involve several lines of code

The Script How Power Users Tested Creating

We gave the power-user group of usability testers a hard-copy drawing and asked them to recreate it as a screen based on fields from three different tables

Lab Notes What Our Testers Said about Creating Forms "I created the [FoxPro] form using the Wizard

but found it easier to correct my mistakes not SEMICONDUCTOR FOUIPMENT MECHANIC

"Creating an Approach form was as simple as choosing the Create menu and selecting Form. Since the data was pulled from more than one database, the to be joined first. That took a little time to figure out."

CATALOGER

Forms Get Formal

Simple data-entry forms built by end users are great they offload that work from more experienced power users. But just because power users have more experience doesn't mean you should ask them to work harder. If anything, because they're working on building forms, reports, and menus all day long, power users should have tools that make them just as efficient. Here's where you'd hope the visual capabilities of Windows would pay off, but in our tests they didn't.

In the past, creating a form (or data-entry screen)

required typing many lines of code. The visual tools available in the applications we tested have improved upon this. We asked power users to create a form from three tables. However, none of the programs had tools to help users link a table at the same time they created the form. This proved highly frustrating, severely affecting the bottom-line score for this task.

While Lotus's Approach lead this round-with most of the other packages not too far behind-the power users found the databases significantly less usable overall than the end users did.

Thanks to its friendly and powerful forms Expert, Borland's Paradox came in second overall.

I IN			

	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Not quite there.	Testers were pleased with ease.	Mixed reactions from testers.	Testers were flummoxed.	Noticeably lacking.
Productivity	Problems here.	Users appreciated the relative ease.	Lots of backtracking limited productivity.	Failed miserably.	Powerful Expert didn't go unnoticed
Help System	Very good.	A bit lacking.	Not much help.	You're almost on your own.	Needs to be spruced up.
Summary	**	***	**	*1/2	**5

*****Excellent **** Good *** Acceptable **Poor * Unacceptable

End Users: Building Queries

When it comes to pushing a mountain of data into a molehill of useful information, you rely on a database's query designer. With the best query tools, you just have to click on a few fields. Once testers

overcame the initial learning curve for queries, they were pleased. The verdict: If you know where to look, queries are fairly simple.

-		Find Special		
1.	Select the type of find.)K
	Find duplicate records			-
	Exclude first record	found in each set of	duplicates. Ca	ncel
	Find unique or distinct	records in the curren	it found set.	
	Select fields to search.			
2.	Database fields:		Fields to search:	
	EMPLOYEE	TVI	FIBSTNME	-
	EMPLUTEE		LASTNME	
	EMERGPHON	* >> Add >>	SUPVISOR	
	DEPARTMENT	-		
	SS	<< Binning oc		-
	HIREDTE	Clear All		2
	SUPVSREXT	A Clear van	11	
	Tip		- 3	
	Use the exclude option to	o locate extra record	s which you o	-12
	permanently delete. Use			
	one record for each cust	omer before printing	form letters or management	10. 10

Approach: Locating Approach's Find command seems to be the most difficult aspect of getting it to run a query. After that, you just click on a few boxes and fill in a few blanks to track down your data.



Paradox: The query-by-example command helps you get data quickly and easily.

nd Duplicates C	uery Wiz	ard
What information	may be dup	dicated?
Select the field(s) values, and then		o check for duplicate button.
Available fields		Check for duplicates in.
Last Name Title Bith Date Hire Date	• •	Employee ID First Name
Region Postal Code		

Access: Need data fast? Send Query Wizard to the rescue. But after that, finding empty fields is difficult. The Script How End Users Tested Building Queries

We asked our end users to perform two actions: first, create and save a query that would search for everyone living in a certain zip code, and then find all the people without ohone numbers.

Lab Notes What Our Testers Said about Building Queries

"Once I figured out to look under 'Find' rather than 'Search,' [querying with Approach] was straightforward." PROPERTY MANAGER

"The problem [with dBASE] was determining how to start." TECHNICAL SUPPORT

NICAL SUPPORT SPECIALIST

Form of a Question

Are you in jeopardy if you don't know how many widgets your factory produced this month? Are you in double jeopardy if you have that answer but don't know how many of those widgets didn't have flanges? These are the kinds of simple gueries we asked our end users to run with each of the five databases. All five did well, with Lotus's Approach and Borland's Paradox leading the group.

The end users used several methods to figure out how to repeat queries with Approach. While they all applauded how easy it was to search the database, some had problems finding the actual search command. Others had trouble determining how to save the query for future use. When it was done, however, they praised its simplicity.

When it came time to focus the query further looking for the flangeless widget—things became more complicated. Some end users simultaneously praised Paradox for being easy to use and bashed it for what they perceived as "quirks." Several testers remarked that they had trouble with the syntax to find an empty field until they consulted the manuals. Dutto for Microsoft's Access and FoxPro.

Access	Approach	dBASE	FoxPro	Paradox
Query Wizard is a help.	Very nice and simple.	Frequently difficult to decipher.	Query Wizard is great.	Intuitive and fast
Hard to find missing data.	Perfect score.	Superb.	It's a capable, query tool.	Looks great.
Could be better.	Good, specific examples.	Not too useful.	Online help is confusing.	Just acceptable.
%	*	***	***%	***
	Query Wizard is a help. Hard to find missing data. Could be better.	Query Wizard is a help. Hard to find missing data. Could be better. Good, specific examples.	Query Wizard is Very nice and simple. Frequently difficult to decipher. Hard to find missing data. Could be better. Good, specific coamples.	Query Wizard is a help. Very nice and simple. Frequently difficult to decipher. Query Wizard is great. Hard to find missing data. Perfect score. Superb. It's a zapabile. query tool. Could be better. Good, specific examples. Not too useful. Online help is confluing.

*****Excellent **** Good *** Acceptable **Poor * Unacceptable

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Power Users: Building Queries

Database power users tend to have different needs than end users-needs that are far more demanding. Nevertheless, they

praised Lotus's Approach, a package targeted at end users almost as much as Microsoft's FoxPro, which is targeted at power users.

Paradox: Poor documentation seems to have hindered testers in joining tables. This task upset them more than any other.

Approach: For a database without a programming language. Approach sure makes users happy.







FoxPro: When the going gets tough, the tough turn to FoxPro. It may not have the slickest interface, but it knows how to make complex table joins. Lab Notes

The Script How We Tested **Building Queries** Power users created

formatted table.

and saved a query ioining three tables on one field, then had it out the result into a

What Our Testers Said about **Building Queries** "TFoxPro's 1 Wizard prompted me to save the query if I planned to use it in the future." CATALOGER "The steps to create the query (in Paradox) were cumbersome. There seemed to be considerable and unnecessary clutter on the erroon

PRODUCT MANAGER

The Inquiry Goes On

Just a few more things we'd like to ask. For instance, how does topic A relate to topic B in conjunction with topic C? In database terminology, you get the answer to a complex query like this by joining three tables, each relating to a different topic. Something called a "threetable join" sounds like it should be simple, but it lies firmly within the purview of power users. Windows databases haven't progressed that far yet. Not surprisingly, Microsoft's FoxPro pleased the testers most,

With its xBASE development language, FoxPro

admittedly targets power database users more than end users. However, applications for power users tend to be somewhat, shall we say, difficult to use. But FoxPro's Query Wizard breaks that mold. The usability of the Ouery Wizard was universally applauded by our testers.

Lotus's Approach followed close behind FoxPro. although it uses the term find when the traditional database term is search or query. Although one tester found this refreshingly obvious, it threw some testers for a loop. Aside from that, the power users agreed with the end users that Approach made it easy to both create and save queries.

SUMMARY					
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Middle of the road.	Easy to create and save queries.	Problems here.	Wizards make it easy to be powerful.	Road kill.
Productivity	It took a while to work through.	Quick and fruitful.	No particular productivity.	Incredibly fast.	Obstacles and hurdles everywhere
Help System	Testers found the answers.	Well done.	A big boost to its score.	Some gaps, but acceptable.	Some never did figure it out.
Summary	**	***5	**12	****	*1/2
					11011

End Users: Compiling Reports

All of the end users struggled with creating reports, so although Approach and Access received relatively high marks, there was no clear winner for this task. Unlike the results in other

tasks, testers were moderate in their praise of the leaders here. There were stumbling blocks on the way to the finished product.

Approach: The Report Assistant mixes The Next button and a tabbed approach.

Paradox: Buried inside the Report

Expert is a

nifty tool for

report to the

screen at a

resolution

selected

outputting the







Access: The Report Wizard is useful, but it misses a visual element. It would be nice to see a thumbnail view of the report you've selected, so you'll know whether you're on the right track toward the end result.

The Script
How End Users
Tested Compiling
Reports
We asked usability testers
to take the data they'd
been working on in the
tables and create a report
summarizine information.

Lab Notes
What Our Testers
Said about
Compiling Reports
"Creating the report in
Approach was impossible.
It was very frustrating."
TECHNICAL
SUPPORT STAFFER

the result was 60 pages long. It wasn't easy trying to figure out how to streamline it."

ASSISTANT DIRECTOR OF PLANT
OPERATIONS

"[Access] was easy, but

Needles in a Haystack

The power of databases has always been their ability to consolidate an abundance of business information. Windows contributes the capability to not only access sections of the data, but to massage them into useful reports as well. Database reports are like venetian blinds for data: If they're designed well, you can adjust them to see just what you want, when you want, when you want to

However, testers found the adjustments harder than they expected when we asked them to create and then modify a simple report. Their reactions were decidedly mixed about the process, and no one product came out shining.

Testers complained that Lotus's Approach had no obsters complained that Lotus's Approach had no obce they found it, the process went somewhat smoothly. Similarly, Microsoft's Access received mixed reactions. Creating a report was a fairly easy task, thanks to the Report Wizard. But when testers were expected to add a chart to the report, some serious tooth-erinfaine resulted.

The others did not fare well either. FoxPro's Wizard and the Borland products' Experts were not as intuitive as our testers hoped they would be.

SUMMARY					
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Wizard made it possible.	Surprisingly mediocre results.	Lowest scorer in this round.	Second to last, poor score.	Lots of dissatisfaction.
Productivity	Not all testers completed the task.	Assistant held testers' hands to completion.	Failure rate was alarming.	More like non-productivity.	Poor results.
Help System	Well-documented, online and in manual.	Somewhat useful, but far from perfect.	Glanngly lacking, both online and in manual.	Lacking and non-intuitive.	Lowest help score: overall.
Summary	***	***	**	**	**

*****Excellent ****Good ***Acceptable **Poor *Unacceptable

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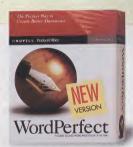
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Power Users: Compiling Reports

The collected Wizards, Experts, and Assistants weren't enough to make report generation a painless task for our power users. Lotus's Approach, however, stood out among the rather disappointing marks. Not surprisingly, its Assistants won the usual praise. For the

Approach: Follow the steps—set up the layout, choose your fields, select the information to summarize. Nice hand-holding all the way through. It won't even let you move on until you've made a selection.

The Script How Power Users Tested Creating Reports

We asked power users to take the data they'd been working on in the tables and create a report summarizing information. Lab Notes What Our Testers Said about Creating Reports

"It seemed easy [in FoxPro], but the report wouldn't appear at first." COMPUTER CONSULTANT "The shortcoming [with Approach] is that you must use the Expert. The way to build it [using the banded method] isn't apparent."

ming (with that you Expert. The it (using the nod) isn't

most part, it was a simple matter of following the bouncing ball to come up with a snazzy result.

Access: Once the Wizard creates the report, go in and tweak to your heart's content. But be prepared to invoke some cryptic commands if you want to add some real computing muscle.





FoxPro: The Add All and Remove All buttons are great shortcuts. These are welcome features in the FoxPro Report Wizard, but they're mysteriously absent from Approach.

Strike Up the Band

While Windows brings consistency to database applications, databases have some underlying consistency of their own. All of the products we tested employ the standard yet unofficial approach of laying out the information for reports in bands (think of the green and white stripes on dot-matrix printer parts to imagine the effect). Nevertheless, although this banded approach has been around for several years, our power users struggled to achieve the proper effect in some cases.

Even with help of the intelligent agents—the various

vendors' Wizards, Experts, and Assistants—there were some concerns. In this phase, the power users were slightly happier with their results than the end users, but not a single program came out shining. Lotus's Approach won this round, but not without its own minor hiccups.

Microsoft's Access and Borland's dBASE for Windows came in closely behind Approach, earning varying degrees of satisfaction. Our testers created the reports with the help of the agents, then further modified and treaked the designs. One tester suggested that it would have been more helpful if the products simply offered a customizable default layout.

Access	Approach	dBASE	FoxPro	Paradox
Passable, but not nearly good enough.	OK, but not as much as expected.	Users weren't thrilled.	The task should have been easier.	Very low rating.
Too low for an important tool.	Highest score (tied for first with dBASE).	Tasks were completed.	Not quite good enough.	Not there at all.
Very good.	Barely serves its purpose.	Needs work.	Painfully lacking.	What documentation
***	***½	***	**1/2	**
	Access Passable, but not nearly good enough. Too low for an important tool, Very good.	Access Approach Passable, but not nearly good enough. Too low for an important tool. Very good. Barely sorves its purpose.	Access Approach Agreement	Access Passable but of OK but not as ready good enough much as expected. Too low for an important tool. Very good. Barely serves ta purpose. All RISES FeatPre Start Wild Serves Start Wild CAS-SL) Very good. Barely serves ta purpose. All RISES FeatPre Start Wild Serves Start Wild CAS-SL) Very good. Barely serves ta purpose. Needs work. Painfully locking.

*****Excellent ****Good ***Acceptable **Poor * Unacceptable

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Power Users: Custom Controls

After the dust has settled on your original form design, it's time to tweak it. We were particularly interested in adding a drop-down list box—one of those features you'd think would be easy to create. It

wasn't. Some testers suggested that they could have completed the task with more time

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Approach: All of the testers agree that it's easy to make simple changes to a form—but that's why they're called 'simple." When it came to adding the list box, Approach was the product that came through most

often with smooth and easy amendments.



Access: After the Wizard's finished, you can start dragging and dropping for most of your changes.



FoxPro: Another Wizard—adding pop-up screens this time—means another easy modification.

The Script
How We Tested
Custom Controls
We asked testers to take
the form they created in
a previous task and
move one field slightly,
and then add a dropdown list box that
included five items.

Lab Notes
What Our Testers
Said about
Custom Controls

"It was easy to make a simple change to the form. However, the process for creating a drop-down list box was unnecessarily hard to find [in Approach]."

PRODUCT MANAGER

"I came closer to creating a list box with Access than with any of the other products."

CATALOGER

Customs Declaration

Only in a fairy tale would the grizzled old power user create a database application and have it live happily ever after. Here in the real world, users' comments are more likely to sound like this: "This is great, but now that I see it, you know what I dreally like it to do?" All of the databases we tested make it pretty easy to create a data entry form—the Wizards, Experts, Assistants, and all sorts of other gadgets simplify the process. But what happens when the end users—or even the power user building the application—on't like the way the

intelligent agents lay out the fields? How easy will it be to incorporate changes? It will rarely come out right the first time, and you'll never get rid of a backlog if the iterative process isn't smooth. Only the power users tried this trick—it's not a nend-user function at all. Unfortunately, even with these Windows databases, it's not as easy a you might like.

Take Lotus's Approach as an example. Overall, testers gave it mostly favorable ratings. Moving fields around the form, for example, posed no problem. But when testers went to create the drop-down list box our test required, they consistently complained that the commands for creating one were hard to find.

SUMMARY					
	Access	Approach	dBASE	FoxPro	Paradox
Satisfaction	Good as Approach.	Testers were happy with the results.	Too frustrating to talk about.	Fussy but fun.	Hated it.
Productivity	Not great.	Good results fast.	Most testers weren't productive.	It just takes too long.	A difficult task to finish.
Help System	Should learn from FoxPro.	Nothing to write home about.	Help system needs work.	Once again, good help.	Help system doesn't
Summary	**%	***	*	**1/2	*
	P P	C. I A II .	. D . FF FF		

*****Excellent **** Good *** Acceptable **Poor * Unacceptabl



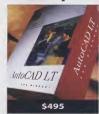
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The Most Usable Database



There are times when usability testing confirms conventional wisdom, and times when it turns it on its ear.

During our database testing, we had both, Conventional wisdom says that end users want to avoid programming, so it makes

sense that Lotus's

Approach should win. But who would have thought that power users want to avoid a programming language, too? Approach and Access provided a solid onetwo punch, ranking highest with all users.





Approach: The notsurprising usability winner with end users and the surprise winner among power users. There's a lot to be said for a database lauded as being "very simple." An application with these results is bound to boost productivity.

Access: Because of the wonderful Wiz it has, Access snagged second place in our usability testing for both end users and power users. Testers say it's "easy" to do most anything with Access. * * *1/2

SATISFACTION: It was an incredibly close race among the top three contenders-all three earned acceptable ratings on averagethree stars. Borland's products were runners-up here.

PRODUCTIVITY: Lotus's Approach stepped out in front as the database that both end users and power users were most productive using. Microsoft's FoxPro and Access

tied for second.

HELP SYSTEM: Approach slipped to third as Microsoft's Access Wizards and online help pushed it into first place, while FoxPro garnered compliments for its documentation.

SUMMARY: Lottes's Approach-with its point-and-click, no-programming interface-proved the most usable database of those we tested. Microsoft's Access was a solid performer too.

Lab Notes: What Testers Said about Windows Databases

Lotus Approach

Step 1: Laured Step 2: Emble Step 2: Select and add fields for Database fields CONTACT ADDRESS ZIP TYPE Cancel

"Creating a form was a simple as choosing the 'create' dropdown menu, selecting form, and following the prompts." CATALOGER

Borland dBASE



"Performing a query on data was relatively simple, but doing indexes or creating a report... was very complex and difficult to complete.' TECHNICAL SUPPORT SPECIALIST

Microsoft FoxPro



"I found [creating a new table] to be very easy-the Wizards were very functional." TECHNICAL SUPPORT ENGINEER

How We Scored

For every usability-tested product, a script is designed consisting of a set of common business tasks. We report test results in three key areas: user satisfaction productivity, and help. The satisfaction score reflects users' preferences on a scale of one to five (five is best). The productivity score reflects the percentage of tasks completed, and the help score reflects how much the documentation and online belo actually helped testers

How We Tested To evaluate the five most popular Windows

databases, we brought two types of users into our Usability Labs- end users

45 D40

SCORECARD

Factor (all weighted equally)

Approach dBASE

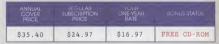
FoxPro

Paradox

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The Most Usable Database



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During our database testing, we had both. Conventional wisdom says that end users want to avoid programming, so it makes

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But who would have thought that power users want to avoid a programming language, too?
Approach and Access provided a solid one-two punch, ranking highest with all users.



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Lab Notes: What Testers Said about Windows Databases

Lotus Approach



"Creating a form was a simple as choosing the 'create' dropdown menu, selecting form, and following the prompts."

Borland dBASE



"Performing a query on data was relatively simple, but doing indexes or creating a report . . . was very complex and difficult to complete."

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How We Tested To evaluate the five

most popular Windows databases we brought two types of users into our Usability Labs- end users and experienced power users. All had used at least one of the products we were testing. We urged testers to think out loud. Some of their "thoughts" annear in the article. Each user was given the same assignmentsfive for the end users six for the power userswhich took about ten hours to complete.

How to Contact Access / Microsoft / (800) 426-9400 / \$329 est. street price / Reader Service No. 666 Approach / Lotus / (800) 343-5414 / \$90 est. street price /

Reader Service No. 667 dBASE for Windows / Borland Int'l. / (800) 233-2444 / \$329 est. street price / Reader Service No. 668

FoxPro / Microsoft / (800) 426-9400 / \$293 est. street price / Reader Service No. 669

Paradox / Borland Int'l. / (800) 233-2444 / \$339 est. street price / Reader Service No. 670

SCORECARD APPROACH RUMS AROUND THE OTHER DATABASES

Factor (all weighted equally)	Access	Approach	dBASE	FoxPro	Paradox
1. Arranging Tables	**** Wizards are the key here.	****5 A simple operation.	**** Its highest marks.	**** FoxPro stands alone.	**** Paradox's strong suit.
2. Importing Data	** ¹ / ₂ Stumble and fall.	**** Match your columns.	**½ This doesn't look good.	** You may never see your data.	** Hard even if you use Paradox.
3. Creating Forms	***½ Paint-by-the- numbers ease,	***% Michelangelo results.	*** An adequate designer.	*** Good enough for the job.	***½ Drag-and-drop simplicity.
4. Building Queries	*** Easy to do.	**** Just click, check, and go.	*** OK if you can figure out how.	***½ Automation is easy.	**% Testers called it a "nightmare."
5. Compiling Reports	*** Use the Wizards.	*** Fairly easy, said testers.	**% Poorly documented.	**% Doing math can be hard.	** Far too complicated.
6. Constructing Custom Controls	**% Hard to add drop- down boxes.	*** It'll be the way you want it.	* This is very disappointing.	**'s Fussy, but it works.	* Chances of getting it to work are low.
Verdict 100%	***%	****	***	***	**12

In **Expert** Hands

When somebody's trying to sell you a database, they make it sound so easy to use. Have you ever wanted to say, "If it's so easy, you do it."? We have, and we did.

Evaluating the reactions of end users and power users to Windows databases is one way to find out how useful they are. But we wanted to see what happens when certified database experts sit down with one of these packages for a day. So we invited some in for a crash test. The analogy: We wanted to gauge what you could expect when your employees get really eood at their chosen database.

then left them alone for

eight hours (naturally, you

We asked Borland, Lotus, and Microsoft each to

provide us with a developer for their applications for eday (Microsoff's Fex-Pro team begged off, citing the impending release of Visual FoxPro 3.0). We supplied each developer with a database design and with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer with a database design and the supplied each developer th

Access: Microsoft's developfinished the tables for our challenge in just 40 minutes.

should plan on more). Their challenge: to build a contact-management application that included tables, data entry screens, and query and report capabilities. We set up each developer with a Pentium system with the latest version of the database already installed.

The results were impressive for the short amount of time we provided. Although | Compared | Compared

Paradox: We liked the clean interface that Borland's developer came up with.

not all of the features we'd requested were there, all the applications ran and looked good. This is great news for anyone who wants to build a quick representation of an application and submit it to the user base for input and suggestions before it reaches final development states.

Here's a look at each of the four contenders, in no particular order. We weren't looking for winners or losers in this test.

Lotus boasts that the average user will make real

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Then the phone rings. "We're sending over 10 new pages of competitive info." Click. Good thing they lock the windows on this floor. You have to get it into the plan by the end of the day. What now?

You think she's finishing the proposal. She thinks you are. Surprise, neither one of you is. And it's 4 hours before the grant committee meets. Let's see, 16 new pages of data, 11 article reviews, 3,600 words sent by your partners in Istanbul. Who can type

progress within two hours of opening the Approach box. Based on what the developer did, we believe it. The Approach application showed how easy it was to create forms that take advantage of either the function keys or the mouse. Bulle in templates—incorporating fields for contacts, companies, employees, and products—made it easy to create the tables we asked for, which shows Lotus has done its homework in anticipating what users might need.

The same held true for the Access developer, who thanks to the built-in Table Wizard—had all the tables for the application created within the first 30 minutes. The graphical view of the tables and links sped up the development of the interface, which can be the time

consuming bottleneck for many products. We found that because Access stores all the database files—forms, queries, tables, and more—in one master file, we didn't have to worry about file man-

Approach: Lotus's developer

easily driven by function keys.

created an application that can be

agement anymore. Borland sent us two experts, one each for Paradox and dBASE. The Paradox developer came up with a clean and intuitive interface for his contribution. And while he deserves most of the credit, some recognition should go to the built-in Forms Expert and the new Project Viewer filemanagement interface.



dBASE: With its easy-to-use search window, we brought up the contact information easily.

The power of ObjectPAL, Paradox's object-oriented development language, also showed in the application's nicely consistent data-formatting and help screens.

What does Borland's dBASE have that all the others don't? A huge installed base of developers, which means it may be easier to find the expert you're looking for. Our dBASE developer liked the option of switching modes and getting to the much-belowed doe prompt. Most impressive in the dBASE application the easy-to-use search window.

All four of the databases used in our challenge provide powerful, easy-to-use tools. In the right hands, they can quickly deliver a fully functioning application that will give you quick access to the data you need.

ADAM MEYERSON



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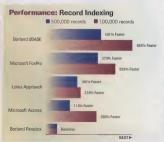
Engines Roaring

In addition to the usability testing we conducted on the five Windows databases in our own Usability Labs, we sent the products to ZD Labs for performance testing. All products were tested on identically configured test benches. We first imported data from ProPhone, a listing of California telephone numbers. We imported records numbering 10,000; 50,000; 100,000; and 500,000, and timed the process. Next. we

created an index of data using one field, then two fields, and measured the time it took. We then timed queries and different output formats (screen, printer, and files). Not surprisingly, the runaway winner in the query test was Microsoft's FoxPro, thanks to its Rushmore engine technology, Lotus's Approach, our usability winner, didn't top any of the performance tests.



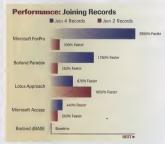
Flip-flop: Usability doesn't necessarily equate with performance. The easiest packages took longest to load.



Juggling Act: For sorting data into indexes, Borland was on top—and bottom—no matter how many records.



Braving the Elements: In a query of 10,000 elements, FoxPro's Rushmore engine technology gave a big boost.



Join Venture: Combining indexed records showed no clear winners; dBASE brought up the rear, though.



olstoy became infuriated whenever asked to edit or revise his work. Reminds us of someone using our competitors' flow charting software.

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It's All Relational

Overall, our testers rated Lotus's Approach the most usable Windows relational database, but it's not necessarily the best database for everyone. Microsoft's Access was a close second. For your particular needs, one of the other databases might be better.

Who offers the best query performance? If speed of accessing data is your main consideration, to Microsoft's FoxPro, which outperformed all of the other databases by a healthy margin in overall query performance. Surprisingly, although Microsoft's Access is built on the same basic database engine as ExxPro, its performance is notably slower in queries.

Who offers the best performance overall? The answer is slightly different here: Borland's Paradox can delete records much more quickly than even Fox-Pro, so when it comes to the aggregate speed in doing all sorts of database operations, Paradox is the winner.

Who offers the best programming language? Choosing a programming language is highly subjective, so we won't try to answer that. But Access's Basic-like development language is certainly

Choose the next most

easy to learn. If you're familiar with the xBASE programming language, you'll probably be most at home with dBASE for Windows or FoxPro. The most potentially powerful programming language is Paradox's ObjectPAL, but its syntax can be a bit daunting.

Who offers the best access into SQL databases? They all support Open Database Connectivty (ODBC), the de facto (if somewhat pokey) standard for gaining access into larger databases. Most offer direct support for enterprise databases such as Oracle and IBM's ever-popular DB2.

Beyond the issues of usability and performance, these Windows databases share many of the same features, thanks to competitive pressures. When choosing one, then, you need to take into account who!ll be using it the most. For instance, do you have a backlog of applications that your developers have to attack now? Or is end-user productivity dwindling because of a confusing application that needs to be revamped? Whatever the answer, these departmental databases can help you confront the congestion.

DECISION MAKER

Choose the factor

WHAT'S THE BEST WINDOWS DATABASE FOR YOUR BUSINESS?

What else is

important? that's most important. important factor. product to buy is ... Lotus Approach **Application Development Tools** Ease of **Generating Reports** Microsoft FoxPro Ease of Performance Querving Data Microsoft FoxPro **Application Development Tools** Performance Ease of Generating Reports Lotus Approach Application Development Tools Lotus Approach Fase of Fase of Querving Data Microsoft Access Performance Generating Microsoft Access **Application Development Tools** Reports Performance Ease of Querying Data Lotus Approach **Application Development Tools** Fase of **Querying Data** Ease of Generating Reports Microsoft Access Performance Microsoft Access **Application Development Tools** Fase of **Generating Reports** Ease of Querying Data Microsoft Access

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The Powerful Database Anyone Can Use.

PHOTOGRAPH BY KEVIN CANOLANG

The Mother of All **Upgrades**

SYNOPSIS

THE SOFTWARE:

Everyone's doing Windows 95. Here's the lowdown on upgrades to suites, utilities, and applications. 180

THE INTERFACE: The new wave of apps gets a usability boost from the consistent Windows 95 interface. 182

THE HARDWARE: As
anyone who has
struggled with a
sound board can
testify, even a little
Plug and Play is a
very good thing, 184

FINAL ANALYSIS: The who, what, and when of 30 top Windows 95 upgrades. 186 ow much will it *really* cost to upgrade your office to Windows 95? Don't answer too quickly. Yes, you'll have to spend more than you planned, but probably not for the reasons you thought. In relative terms, the cost of the new operating system itself is a mere pittance. You won't need to invest

in all-new hardware, either, although a few extra megabytes of RAM on older PCs won't hurt. And after the first round of orientation sessions, your training and support bills may actually go down.

But if your company's PCs are stuffed with software—and these days it's rare to find a Windows PC with fewer than ten applications on the hard disk—get ready for a tidal wave of upgrades for at least \$49 per product. Of course, old 16-bit applications will run under Windows 95, but without the added 32-bit features. If your budget doesn't have enough zeroes on the software upgrade line, it's time for a heart-to-heart talk with the CPO.

PC Computing surveyed more than 90 top software developers to get the lowdown on their plans for Windows 95. We also looked at the first wave of Plug-and-Play peripherals, some of which are already available, to see how they will combine with the applications to change the way we work.

Every major software vendor we talked to told us that releasing a Windows 95 version is at the top of this year's to-do list. Most have committed to aggressive delivery schedules, which means you can expect to see 32-bit versions of most of the mainstream business applications you already use within 90 days of Windows 95's release.

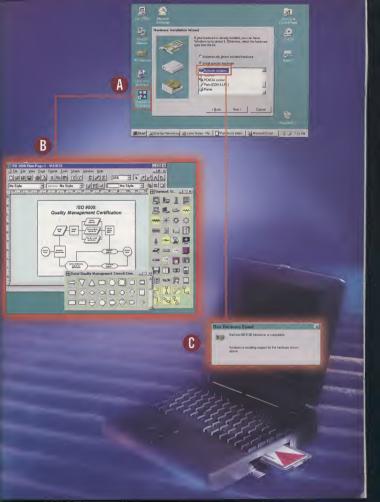
Even if you take advantage of every cut-rate offer available, it works out to a lot of upgrade dollars, so our survey also asked what kind of return you can expect on your upgrade investment. Most application developers told us it's still too early to divulge details of new features, but they all agree on one thing: Windows 95 will usher in the Year of the Upgrade.

BY ED BOTT AND YAEL LI-RON

A JUMP START: You can do it all from the Windows 95 desktop.

B LAUNCH PAD: From this starting point, you can launch 32-bit applications like Shapeware's Visio. The payoff includes filenames that make sense and a consistent, up-to-date look.

SMOOTH SAILING:
The desktop is
also the message center
when you want to
configure a new piece
of hardware, such as an
ethernet adapter card
for a notebook. And
Windows 95's hardware
wizard handles the hard
work of installation.



Apps under Construction

Windows 95 is scheduled to arrive before the end of August, which means that anyone in the state of Washington who can speak C++ is already working around the clock. But this is no remake of Sleepless in Seattle. They're also working the late shift in Cambridge, O'em, Cupertino, and Atlante.

According to our survey, 30 percent of the leading software makers plan to ship their next versions no later than the day Windows 95 arrives. More than 70 percent say their new versions will be on store shelves within 90 days after the new operating system is ready. Here's what you can expect from the first wave of apolications.

The Suite Story The most eagerly awaited upgrades are the biggest ones: the all-in-one software suites from Lotus Development, Microsoft, and WordPerfect.

Expect a major upgrade to Microsoft Office, whose core applications, Word 60 and Excel 5.0, have already shipped in 32-bit versions that run on Windows NT and will run on Windows 95. Look for Microsoft to continue its push to standardize the interface of all Office applications beyond the simple menu-and-toolbar level. And look for the new Office to be available fewer than 90 days after Windows 95 appears.

Like its cross-country rival, Lous will use this uggrade to polish its Smart-Suite interface and add major features, especially to the oldes member of the family, Ami Pro. Denails of those features and when you'll see them in shrink-wrap are tightly guarded secrets—but you'll get short odds if you bet that the new SmartSuite will appear before the new Microsoft Office. WordPerfect, which it ust delivered

the first version of PerfectOffice last November, is poised to turn around a Windows 95 version before the end of 1995. It's most likely that WordPerfect will concentrate on porting its flagship word processor to 32-bit code. Don't expect a slew of new features.

Utility Players The day you install Windows 95, your favorite utilities will probably stop working. The long filenames and extended attributes in the Windows 95 file system make upgrades mandatory. Symanete has already promised that a new 32-bit, fully graphical version of the Norton Utilities will arrive the same

day Windows 95 does. New versions of Norton AntiVirus are also due.

Other driver-level utilities are due for updates as well. Stac Electronics has a new 32-bit version of Stacker in the pipeline, McAfee is planning a free Windows 59 upgrade to VirusScan within 90 days of Windows 95, and even Helix Software's NetRoom memory manager has a future after Windows 95.

The Windows shell game is a little more confusing. It's unlikely that anyone will replace the complex Windows 95 shell; instead, Symantee is likely to update pieces of Norton Desktop and Central Point Software's PC Tools for Windows, like the first-rate Central Point File Manager, for the new era.

Other Eagerly Awaited Apps What are the other best-selling application vendors planning? Datastorn isn't talking about ProComm Plus, but NCSA Mosaic is in great shape. AutoDesk is unwilling to comment on what its AutoCAD plans are. Where does your favorite application fit in? See "The Shape of Software: 30 Apps Worth Waiting For," page 186, for the inside story, Oh, yes, Doom for Windows 95 will be available immediately.

NEW LODK AND FEEL: With consistent SmartLoons, menus, InfoBoxes, and the LotusScript development language, Lotus is betting that it can deliver the most tightly integrated suite for Windows 95. The final release may look dramatically different from this early freelance Graphics demo.



ALMOST PERFECT? The centerpiece of PerfectOffice should be faster and smarter, thanks to multithreading in printing, spell-checking, and other subsystems. This prealpha version wouldn't qualify for the Windows 95 logo, though—the long filename should appear first in the title bar.



The first wave of Windows 95 applications should run faster and more reliably, thanks to the muscle of **32-bit code.** You'll see fewer "Out of



memory" messages because Windows 95 handles system resources more intelligently. And Windows 95's document-centric approach takes advantage of the ubiquitous OLE 2.0. If you couldn't stand OLE's herky-jerky performance and endless error messages under Windows 3.1, get ready to take another look: OLE finally begins to deliver on its potential under Windows 95. Mail and communications services are built into the operating system, making it possible for any application to extend its reach far beyond the desktop.

32-bit Code: If you see the Windows 95 logo on a new application, you can bet it's 32 bits from top to bottom. The payoff? Less swapping of memory and speedier performance, especially in CPU-intensive operations like recalculating a spreadsheet.

System Resources: Some Windows 3.1 applications developed a nasty reputation for chewing up system resources and refusing to give them back, even after you quit. For all practical purposes, Windows 95 removes those barriers.

OLE 2.0: Under Windows 3.1, data sharing is a hit-or-miss proposition because of OLE's huge resource requirements and slow performance. The 32-bit OLE engine in Windows 95 is vastly improved, and our survey showed enthusiastic support for OLE in the next generation of Windows and processing the proposition of the property of the pro

Mail and Communications Services: Look for simple Send Mail commands on the File menus of business-oriented applications. And the Windows St Telephony Application Program Interface (IAPI) will usher in a revolution in communications software. IAPI handles the dirty work of configuring modems, setting up dialing options, and managing COM oorts.

BRA6 AND BROP 95: For the past two years, Visio has been the official poster child for OLE 2.0. The 32-bit version, which should appear simultaneously with Windows 95, will be tightly integrated with the new Windows shell. In the spirit of OLE, stencil palettes can "float" anywhere on the desktop.



PASIMS DR. NORTON: A lost file is a lost file, whether it disappears 16 or 32 bits at a time. Look for the Windows 95 version or the Norton Utilities—including an updated Norton Disk Doctor and a comprehensive System Doctor—to be available the same day that Windows 95 hits the streets.



New **Look** for the Next Wave

Will your next software upgrade pass the Windows 95 test? If you see the Windows 95 togo on the box, you can bet it will. Before a software vendor can carn Microsoft's blessing to use the new logo, the upgrade has to run an eight-point gauntlet covering the basics of the new interface.

All but two of the software companies that responded to our Windows 95 survey told us they expect their new releases to pass the test with flying colors. That remarkable display of solidarity is testimony to the selling power of the new logo; it's also a tribute to the usability benefits of the new interface.

The new one-click Minimize, Masinize, and Close buttons are part of a strategy to virtually eliminate doubleclicking. Other consistent elements you can expect to see at nearly every turn include the Explorer, a chameleon-like file-management tool, and shortcut menus that pop up with a right-click for instant access to common commands.

What's inside the new user interface? And what can you expect to find inside your upgraded applications when you see the Windows 95 logo on the box? Here's a partial list. It's a Document-Centric World The architects of Windows 95 want you to stop thinking of the program that created a document and simply think of the document itself. Support for long filenames is a must, and to manage those files you'll use the new common dialog boxes that appear in response to File Open and File Save commands.

One of the most subtle indications of the shift to a document-centric world appears in the title bar, where the new style guidelines dictate that the name of the document must appear first, followed by the name of the program that created it.

If the document's extension is registered, the Windows 95 default is to hide the extension, and Windows 95—compatible applications have to do that as well, in the shell, in title bars and dialog boxes, and with icons.

and dialog boxes, and with icons. Use an INI File, Go to Jail? There's no ambiguity in the Windows 95 application guidelines: Your preferences must be stored in the Registry, a more-or-less central store that theoretically allows you to log in from any workstation, anywhere on the network, and see your familiar desktop. Any software developer that uses INI files instead of the Registry does not pass Go, and it most certainly does not collect the Windows logo.

The guidelines are also clear when it comes to removing an application. Windows 95 includes a Control Panel applet that lets you uninstall an application and clean up the Registry.

The Rest of the Test Documentcentricity is a baby step on the road to compound documents that consist of data from everywhere, so it's not surprising that support for object linking and embedding (OLE 2.0) is also on the mandatory list. You can expect your Windows 95 applications to recongize universal naming convention filenames—prefaced by server names rather than drive letters. And every File menu must have at least simple Send Mail capability.

Other elements in the Windows 95 style guidelines are strongly recommended but not mandatory, and the rules for utilities, development tools, and games are slightly relaxed. With those notable exceptions, you can expect the first wave of Windows 95 software to be remarkably consistent.

CASTIME A WIDER NET: Redoing NCSA Mosaic for Windows 95 was a snap, say its developers, because the program was already written in 32-bit code. The de facto standard for navigating the World Wide Web should be easier to set up with the built-in TCP/IP support of Windows 95.



CALLING ALL MESSAGES: Telephony in Windows 95 brings voice messaging capabilities to Delrina's WinFax Pro. Need to edit WAV files or record conversations or memos? They pust a button click away. And an integrated log lets you manage voice mail, e-mail, and faxes.



If the "flying Windows" logo is on the box, it means that the application follows Microsoft's user-interface style guidelines, including support for long filenames and use of the new



common dialog boxes for opening and saving files (below).

Other user-interface features that are either mandatory or strongly recommended under the logo program: extended property sheets that store custom file information, shortcut

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menus that pop up with a single right-click, and preferences that are saved in the **Registry** rather than in countless INI files. Common Dialog Boxes: The new File Open and Save dialog boxes let you right-click on any file or drive icon to add a new folder, delete or rename an existing file, or quickly view a file's contents. These common dialog boxes are a variation of the Explorer, which appears throughout Windows 95.

Property Sheets: Any application can register a file type and add its own tabbed pages to the properties for the files it creates. For example, summary information added to Microsoft Word and Excel documents shows up when you rioth-tilek on the file.

Shortcut Menus: Contextsensitive menus that pop up with a single right-click are "strongly recommended" under the interface guidelines. Our prediction: Most applications will support the new menus.

Registry: Preserving the configuration of your Windows 3.1 applications can be a nightmane, with strey bits of information deposated in view, 1975. The street of the configuration of the configuration of the configuration of the Registry instead: In addition to easier uninstallation, it gives network users the ability to preserve their preferences even if they log in from another workstation.

INSIDE INFORMATION: Windows 95's Quick View utility lets you inspect the contents of a file by right-clicking on its icon, but you can't do anything with the data. Want Clipboard and printer support? Look for Systems Compatibility Corp.'s low-cost upgrade, called Quick View Plus.



and a high-carbohydrate danner. No coffee except between 3 and 5 p m On day two, FAST on light meals of salads, light soups, fruits and

pures. Again, no coffee except between 3 and 5 p.m.

FROM C TO SHINING C: Borland's C++ (bottom) and Microsoft's Visual C++ (top) let developers crank out 32-bit Windows 95 applications in record time. Borland lets developers use the same code base for 16- and 32-bit versions, while Microsoft's Wizard adds instant OLE support.



Hardware on **Easy** Street

Jumpers, dip switches, IRQ conflicts, and the dreaded CONFIGNS: This is the stuff that nightmares—and Apple commercials—are made of. So what if you woke up one day and discovered it had all been just a bad dream? That you could plug in a printer, sound board, CO-ROM drive, or PC Card and it would literally configure itself? Only a world with the configure itself? Only a will work perfectly every time, but our early experience has been positive.

Desktop Systems Plug and Play's real power is its ability to automatically configure a device. If you've ever had to set jumpers or dip switches to resolve IRQ conflicts, this one's for you. True Plug-and-Play devices don't use jumpers. Windows 95 will reset the DMA, base memory address, even IRQ estings. Current offerings of Plug-and-Play boards include Future Domain's PNP-1630 (an ISA SCSI controller), Media Vision's Pro 3-D sound eard, and Advanced Micro Devices' PCnet-ISA+, a no-Fiss tehernet card.

Portables A Plug-and-Play BIOS means a dramatic new way to work with mobile computers. Say your docking station provides the connection to

your network. Without Plug and Play, when you remove the notebook from the docking station, you first have to save your work, then put the system in "sleep" mode. When you power it on again, you need to reconfigure the system so that it doesn't look for the network. When you plug it back in, you have to reconnect to the network.

The scenario is simpler with a Plugand-Play notebook: When you press the Fiect button on the docking station. the BIOS alerts the operating system that you're about to disconnect; the operating system informs your open application, and you see a dialog box asking if you want to save first. Next, the system unloads the unnecessary network driver and gracefully breaks the network connection. Plug the notebook back in, and the network driver reloads automatically, then reestablishes the network connection. Some notebooks that have the SystemSoft Plug-and-Play BIOS are Hewlett-Packard's Omni-Book 600PC and 4000PC, and Digital Equipment Corp.'s HiNote and HiNote Ultra. Using the same principle, you can also print a document when you're on the road, away from your

printer. The operating system will graciously defer the print job until you plug the notebook back in to the docking station, at which point it'll start printing automatically.

Peripherals A few devices, available today, will change the way you work. For instance, when you insert a PC Card into a socket, the system curves are informed to the activities of the new device is in place, then configures itself and informs running applications of the new presence. Some of the PC Cards already available are 3 Com's ErherLink III net adapter, Xircom's Credit. Card Ethernet-Modem II, and Maxtor's MobileMax Type III hard drive, which provides 262MB of storage in a single 3 Longe in a

With a bidirectional parallel port, your Plug-and-Play printer (such as any member of HP's LaserJet 4 family), can easily communicate with your system. Two Plug-and-Play mice are already available: Logitech's Mouse. Add a Plug-and-Play monitor, such as one from NEC's MultiSyne XP line, and Windows 95 will identify its—resolution, refresh rate, and refresh rate, and

INSTANT RECOGNITION: Add a new device to your system in this case, a network adapter in the PC Card format—and Windows 95 senses the change and loads appropriate drivers. Remove the device, and the drivers are dynamically unloaded to free up memory for applications.



DO IT YOURSELF: What if Windows 95 doesn't recognize a new device? Configure it manually using the Hardware Installation Wizard. Pick from built-in lists or add a new device using drivers on a floppy disk. If it's not a Plug-and-Play device, you may have to deal with IRQs and the like.



A complete Plug-and-Play system includes four components: a new BIOS, which acts as mediator between hardware, operating sys-





tem, and applications; the operating system. of which Windows 95 is only the first one:

jumperless, switch-free, software-configurable

Plug-and-Play peripherals, which make installation, configuration, and hot-swapping easier; and upgraded

applications, which can respond appropriately to system events. Even with an old BIOS and so-



called legacy hardware, you still can see a payoff from Plug and Play, because many of its benefits come straight from the operating system.

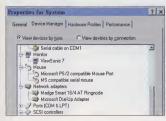
BIOS: For notebooks with docking stations, a Plug-and-Play BIOS lets you dock and undock at will. reestablishing connections to networks and desktop devices on the fly without requiring that you hit the suspend switch or reboot.

Operating System: Apple fans can argue that the Mac is the original plug-and-play platform. but Windows 95 is the first true Plug-and-Play operating system for the PC. The key is Windows 95's capability to maintain a central database of all hardware installed even if it's not currently available.

Peripherals: Not all Plug-and-Play devices are created equal. The ideal peripheral is a SCSI. adapter, network interface, or sound card whose resources can be reassigned from the Control Panel, Many non-Plug-and-Play boards can be identified by the operating system, but their configuration depends on iumpers or dip switches

Applications: Plug-and-Play-aware applications are one notch smarter than the average application. A Plug-and-Play-aware application can work with Windows 95 to deal intelligently with configuration changes-for example, by asking whether you want to save auropen file to the network server before your notebook's network connection disappears.

CENTRAL MANAGEMENT: Want an inventory of all the hardware in a given system? The System Device Manager is the window into the Registry's collection of hardwarerelated information. The bright-red X means the second mouse driver is installed but not currently active.



NATURAL RESOURCES: Windows 95 handles resources more intelligently than DOS or earlier versions of Windows ever did. The Resources tab on each device's properties sheet identifies IRQs used, DMA settings, and I/O addresses. Conflicts show up in the box at the bottom of the dialog box.



Apps Everywhere

We tried. We looked everywhere to find a major software developer that wasn't aggressively working on a Windows 95 version. We contacted more than 90 vendors and got the same response: We'll be there.

Some big names, like Intuit and Aldus, acknowledge that their Windows 95 development is under way, but they're keeping their plans well cloaked. Others, including several Microsoft divisions and the makers of small utilities like Metz Software's Task

Manager and ElseWare's FontWorks, confirm their development plans but don't provide enough information about new features to earn a place in this table.

But even at this early stage, the conclusion is inescapable: Within a few months of Windows 95's release, there will be hundreds of mainstream applications rewritten in 32-bit code and fully integrated with the new interface. When Windows 95 fingly arrives, it will kick off the Year of the Upgrade.

The Shape of Software: 30 Apps Worth Waiting For

Company and Product What's New?		and Play	OLE 2.0	Release Date*
DacEasy DacEasy Accounting Financial management	Follows guidelines for Windows 95 interface—tabbed dialog boxes, property sheets, and so on. Multithreading should improve performance. Full support for OLE (client and server, as well as OLE automation). Built-in communications capabilities.	N/A	Υ	90
Lotus Development SmartSuite 1-2-3, Ami Pro, and more	An all-new 32-bit code base, plus smarter SmartMasters, more Wizard-like Assistants, and a more consistent interface. Look for the LotusScript language to show up throughout SmartSuite. Integration with Notes should be tighter than ever.	Y	Υ	?.
Microsoft Office for Windows 95 Standard and professional editions	Expect a major upgrade to all office components. The 32-bit versions of Excel and Word (for Windows NT and Windows 95) were released last November. Priorities for the Windows 95 version of Office include support for the new user interface and more emphasis on consistency of dialog boxes and individual features.	Y	Υ	90
Shapeware Visio Drag-and-drop drawing	Enhanced drag and drop, including right-mouse-button support, plus the capability to create and open new documents directly from desktop. Able to generate OLE events. Plug-and-Play awareness means users will be notified if connection with file is lost.	Υ	Υ	O.
WordPerfect/Novell PerfectOffice The newest suite	No dramatic new features, but 32-bit code should mean better performance, while multithreading and multitasking will concentrate on printing and spell-checking. The major focus for developers is improving network access.	TBA	Υ	Post of
America Online AOL for Windows 95 Online service	Multiple threads and preemptive multitasking should improve overall performance. OLE 2.0 drag and drop to/from text fields will be available in the first Windows 95 release, but not all features from the Windows 3.1 version will be supported initially.	TBA	Υ	ionia.
DCA Crosstalk Communications/fax	Full support for the Windows 95 interface. Integrated with Microsoft Exchange Server, the bullt-in universal mail client. New features will include a GIF wewer and additional terminal emulations. OLE support? Certainly as a server, possibly as a client.	Υ	Υ	90
Delrina WinFax Pro, WinComm Pro Communications/fax	Fully integrated with MAPI address books, supports voice mail, enables call discrimination. Improved telephony support should simplify modern setup. Multithreading/multitasking capabilities should provide true background operation, and OLE will permit in-place editing of faxes and cover sheets.	Y	Υ	90
NCSA Mosaic World Wide Web browser	Because Mosaic is already a 32-bit program, it will perform better under Windows 95. Built-in networking should simplify setup of Internet connections, and OLE automation will let users write programs (in Visual Basic, for example) that send Mosaic out to search the Internet for specific items.	TBA	Υ	, O
Traveling Software LapLink for Windows File transfer, remote access	Windows 95's Plug and Play and improved modem and telephony support should improve usability and make it easier to connect to remote sites. Theoretically, a Windows 3.1 user can connect to a Windows 95 machine and run applications remotely.	Υ	Υ	180
Artisoft LANtastic Peer-to-peer networking	The combination of card-and-software starter kits with Plug and Play should make installation much simpler, Look for enhancements in security, performance, interoperability (including OS/2 and TCP/IP environments), and network navigation.	Υ	Υ	Pagin
Collabra Software Share Group discussion forum	Tightly integrated with Windows 95 interface so users can navigate easily between applications. Better integration with e-mail. Easier, more pervasive network connections. Current version supports OLE, and the Windows 95 performance improvements should increase use of OLE.	N/A	Υ	180

Target

Company and Product	What's New?		Plug and Play	OLE 2.0	Target Release Date*	
WordPerfect/Novell GroupWise Mail/scheduling		nakes it easier for users to access functions ogram behave consistently and correctly stached from network, Full OLE support.	Y	Y	90	
Borland Simplify Dashboard Desktop add-in	Full support for Windows 95 interface, in dialog boxes, awareness of long filenam will take advantage of modern support a	ncluding extensive drag and drop, tabbed les, and use of the Registry. SmartDialer and Dial Helper. Partially an OLE client.	Y	Υ	90	
McAfee VirusScan Virus detection/removal	Easier installation and use thanks to Wir property sheets. Plug-and-Play support floppy disk or CD as soon as it's inserted provide better protection.	Y	N/A	90		
Stac Electronics Stacker Disk compression	New, all-32-bit drivers will completely re Windows 95. Multitasking will allow con improving performance. Adds support for	Y	N/A	O.		
Symantec Norton AntiVirus Virus detection/removal	An Express (scan-only) version will be a package, with a 32-bit VxD-based archit after they're received via modem and wr	vailable the same day as Windows 95. The full tecture, is due 90 days later. It will scan files ite the file to disk only if it's virus-free.	N	N/A	90	
Symantec Norton Utilities Disk and system diagnostics	Fully 32-bit utilities run in protected mod background operation. Support for long user interface and Registry. Plug-and-Pl to allow incoming faxes or data transfer.	filenames, plus consistent use of Windows 95 lay support will let Norton Disk Doctor pause	Y	N/A	O .	
Corel CorelDraw 6 Graphics package	Fully 32-bit code means better performa graphics files. Full OLE support means it documents that contain graphics, and e	nce, crucial when working with large 's easier to create rich compound asier to work with them via in-place editing.	Y	Υ	o o	
Microsoft Publisher Desktop publishing	dialog hoxes. New 32-bit code means pe	ks to system support for toolbars and common erformance improvements in load times, 2.0 client with full drag-and-drop support.	Υ.Υ	Υ	90	
Software Publishing Corp. Harvard Graphics Presentation graphics	Full support for the Windows 95 interfactor the Uninstall feature. Completely rew files and faster performance—overall anserver support.	e, including easier installation and hooks ritten code means smaller executable d in specific functions. OLE client and	N	Υ	90	
NordPerfect/Novell Envoy Cross-platform portable document software	Full support for Windows 95 interface, w when reading and creating documents. changes in video resolution and available	Y	Υ	?		
Borland International BASE for Windows Database manager	Support for long filenames and the Winc should improve performance. According features that are required for the Windo under development.	TBA	Υ	90		
Microsoft Visual FoxPro 3.0 Database manager	FoxPro 2.6 was already 32-bit, so there's provide FoxPro applications with direct including long filename support and the Plug-and-Play-aware.	Υ	Υ	O.		
Blue Sky Software RoboHelp Help system compiler	Full support for Windows 95 Help file for file. Improvements for developers includ toolbar buttons in secondary windows, a	N/A	Υ	O D		
Borland International C++ version 2.0 Development environment	Current 16-bit version supports Window improve compilation speeds and increase easily add OLE client and server support	. N	N/A	90		
Microsoft Visual C++ Development environment	Features will not change from current we will be the only difference. Plug-and-Pla server, container, automation) can be ac	Υ	Υ	ordered had		
Block Financial Software Managing Your Money Personal finance	Completely compatible with Windows 95 make data sets easier to identify. Greate use hierarchical lists extensively. Plug ar	γ.	Υ	0		
CrossTies Software CrossTies Personal information manager	Will adopt Windows 95 look and feel, inc dialog boxes, and 3-D controls. DLE sup folders into programs and vice versa. Int browsing, and with Exchange for e-mail.	N/A	Υ	90		
Elan Software GoldMine Contact management	New 32-bit code base should improve p interface, including use of rich-text editi May provide custom links to dial-up netv	N/A	N	, O		
NUMBER OF DAYS AFTER WINE	DOWS 95 SHIPS THAT UPGRADE IS DUE.	-				
Applications/Suites	Communications Networking & Groupware					
Publishing & Graphics	Databases	Development Tools		tem Utili siness Uti		

CTOSSTOADS QICvs. DAT: The Most

OIC: Quarter-inch cartridge drives come in many shapes and sizes. from internal desktop models to server-based multigigabyte drives. The drive writes data in narallel tracks on a fast-moving tane When it gets to the end of the tape. the drive reverses direction and shifts the heads to record on the next track on the tape.

Pros

- The DC2000 minicartridge has a strong presence in desktop PCs.
- · Many models : un from the floppy-drive controller
- A wide variety of capacities is available.

Con

Tapes are expensive.



Verdict



DIC: For server-based backups. there are no

compelling reasons for proponents of DAT to move to QIC DC6000 cartridges, or vice versa. But for the majority of people who use QIC's smaller format DC2000 minicartridges. disk drives larger than 300MB require more than

one tape for a full backup: That's a significant reason to move from smaller QIC tapes to larger, SCSI-based QIC systems. The reasons for using a DAT system for desktop backups, however, are less clear. The old conventional wisdom still holds in our assessment-DAT for servers QIC for desktops.

The Buzz



There was an even split of votes among the respondents to our survey of industry experts. And that's not surprising, since each technology serves different needs. QIC tapes come in two formats: the paperbackhook-size DC6000 and the half-size minicartridge

DC2000. Minicartridge QIC tanes hold about 250MB of data (sometimes more with compression), at a cost of about \$15 to \$20 each. DC6000 QICs reach tens of gigabytes each (compressed) for around twice the minicartridge price DATs allow for up to 8GB of uncompressed storage per tape at a cost of about \$7 to \$20 each.

Popular Tape Backup Techniques Vie for Desktop Domination

ILLUSTRATION BY TIMOTHY FOWARD DOWNS



DAT: Digital audio tape works like the technology in a recording studio or a VCR. A spinning drum with two read heads and two write heads records data in a herringhone pattern recording on slow-movina tane that's wrapped around the drum.

Dree

- Tanes are
- inexpensive. Uncompressed DAT canacities are generally higher than OIC canacities.
- DAT drives have a significant presence in the server market.

Cons

- Tane is more susceptible to moisture and
- extremes of heat Data rates are slower than comparably equipped QIC drives.

Timetable



for All: Both technologies will get a capacity boost within the snace of a year: The National Storage Industry Consortium (NSIC) is researching ultrahighdensity recording technology. The goal? To increase recording density in tape backup and hard

More Gigabytes

disk drives. They are planning multilateral expansion: The idea is to bring both DAT and QIC recording densities up to one terabyte per cubic inch at massively enhanced data rates. This stands to prevent obsolescence in both QIC and DAT tape technologies as hard-diskdrive capacities continue to increase

Opinions



DATis handicapped exactly the same way that CD-ROM

was-it was an audiobased technology that operated at audio rates. New DAT-2 drives have doubled that speed, QIC data cartridges operate at substantially higher data rates. Of course, none of that matters: disk and

software overhead evens everything out. Plus or minus a cup of coffee.

WINN L. ROSCH CONTRIBUTING EDITOR

If you regularly do large full backups, DATs are fast, the tapes are cheaper, and they hold a lot more than QIC minicartridges.

> VINCENT CHEN CONTRIBUTING EDITOR

Help: Working Smarter

A Hitchhiker's Guide to File Formats

ouglas Adams fans know the secret to universal communication: Just get your hands on a Babel Fish. This remarkable little invention first appeared in *The Hitchhiker's Guide to the Galaxy*, complete with a detailed technical description of how it worked. Here's the short version: You stick the Babel

Fish—"a small, yellow, leechlike creature, probably the oddest thing in the Universe"—in your ear. As soon as you do, you can instantly understand anything said to you in any form of language.

Unfortunately, the Babel Fish of Windows 95 project is running a bit behind schedule, which means that whenever you try to communicate with a colleague or coworker who speaks some baffling language from another planet—like Lottus 1-2-3 Release 5 for Windows, say, when you speak Microsoft Excel 5.0—you'll meet for find common ground somewhere. The right solution? That depends on what you're trying to accomplish.

Fun with Formats There are some filtertanslations that work well enough for most Earthly purposes. If you want to convert a memo from WordPerfect 5.1 for DOS into Word 2.0 for Windows, for example, you're probably in luck. Why? Because both formats are relatively simple, having been created in a kinder, gentler, less graphical era, and because both WordPerfect and Microsoft have invested thousands of programmer-hours in making sure those file filters work.

But what if you speak Word 6.0 and the guy across the hall only knows Ami Pro 3.0 or WordPerfect 6.1 for Windows? Then life isn't quite so simple: You'll need to find an intermediate file format, a lingua franca that both of you can fall back on. Sound too good to be true? It is. No matter which direction you send it, your carefully-crafted newsletter, with its columns, frames, embedded graphics, and oh-so-precise typographical touches, will loss some of its wonderful Wysiwyg-ness along the way.

If you've pushed the spreadsheet envelope until it's bursting at the flaps, you'll have an even tougher time. It's a sure bet that some of those live links to external data, do-it-all macro buttons, and presentationquality formatting will drop out on the road between Excel and 1-2-3 or Quattro Pro.

Why So Tough? Blame it on creeping feature-itis. Each new version of the big desktop productivity programs packs in more and more features—think of Excel's Visual Basic for Applications (VBA) or 1-2-3's new map-making capability, for example. Reverse-engineering these complicated new tricks and providing a push-button translation option is not a trivial task.

Most of these applications live in different programming environments as well, so fancy features like macros and button bars are difficult—if not impossible—to debabelize. And even seemingly simple details like borders, shading, tables, and styles are handled in different ways by different programs, making life a constant challenge for the programmers responsible for producing filters.

What's a poor, productivity-obsessed user to do? Take your pick from among these three options: You can switch. You can search for a compromise format. Or you can settle for a third-party solution (see "A Versatile File Converter." below).

SOLUTIONS

A VERSATILE FILE CONVERTER

Multilingual: For most of us, fancy file-translation software is overkill. If you exchange files in two or three common formats, do you really need to be able to handle MultiPlan 1.0 worksheets?

But every Windows user should own a copy of Outside In from Systems Compatibility Corp. Version 2.1 g of this program includes filters for 175 DOS. Windows, and Macintosh file formats—including word processors, spreadsheets, databases, faxes, and compressed files. Instead of trying to convert one format to another, Outside In provides read-only viewers that let you copy part or all of a document to the Windows Clipboard, then paste it into the current document. Best of all, you can even orinit a

document without starting up the application that created it. And at a street price of less than \$75, Outside In is a steal

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EXPERT TIP

USE OLE AND ODBC TO PULL IN DATA

The Match Game: What's the best way to bring disparate data sources together? Depending on your data, OLE or ODBC may be the best solution. Every experienced Windows user knows how Object Linking and Embedding (OLE) is supposed to work: Use Edit Paste Special (or drag and drop) to embed one file within another, or link two separate files to create a

compound document. To edit an OLE object, just double-click on it.

But what if you don't have a copy of the program that created the OLE
object? No problem: That embedded object actually includes two types of
data: native data and presentation data. The native data is all the information

object? No problem. That embedded object actually includes two types of data: native data and presentation data. The native data is all the information needed for an application to edit the object; the data is useless without the application in which the object was created. But the object is presentation data provides all the information you need to display the object on a screen and print it. So if you send Excel users a Word document with an embedded Louis 1-2-3 worksheet, they can see the numbers, even if they can't edit them

The Open Database Connectivity (ODBC) solution gives database users the best of both worlds. Instead of attaching a plain old DBF flie to your database application, use ODBC to directly query the data using SQL statements. To get to external data using ODBC, you'll need the appropriate ODBC driver. (It shouldn't be difficult to find; there are nearly 150 supported applications.) Assuming both sides of the request support ODBC, you can create applications that pull data from multiple sources into a single destination—from xBASE, Paradox, and Oracle tables into a Lous Approach application or an Excel worksheet, for example.

Let's start with the unwarnished truth. All file-translation solutions are doomed to failure. Unless your documents are from the Dick-and-Jane school of interpersonal communication—one-syllable words in 10-point Courier—the best you can expect from most file-translation solutions is that they won't diseard too much of your data in the journey from Point A to Point B.

If you regularly share highly formatted documents and you can't compromise on quality, your best choice is to standardize on one application in each category. Arm wrestle, if you have to Draw straws. Get a neutral third party to make the decision. But take the plunge, because that's the only way to guarantee that you'll see the same thins on both screens.

Compromise Solutions Of course, I'd rather give up a kidney than give up my word processor. If you and your coworkers feel the same way, then you'll need to agree on a less datast colution. The secret of (partial) success is compromise—finding a file format that lets you share as much as possible without sacrificing productivity. Here are the best universal formats for the four major data types:

Text Treatments ASCII text is the

lowest common denominator. When you save a file in this format, you preserve most of the words and numbers, but you lose things like fonts, margins, tables, lines, and shading. That's fine for ordinary e-mail, but lousy for any document where appearances matter.

Instead, use Rich Text Format (RTF). For anyone working in a graphical environment—and that includes Windows and Mac programs—RTF is the only way to go. The RTF specifications are incredibly complex; Version 1.3, available from the Microsoft Software Library as GCO165.EXE, includes more than 44 pages of densely packed information in (appropriately) Rich Text Format. The spec includes everything you can imagine, from obvious stuff like fonts and colors and margins and tabs to tricky features like revision marks, style sheets, and embedded objects.

The people who make word processors guard their proprietary formats more closely than the formula for Classic Coke. But RTF is a published, universally accepted specification, which means that when you open or save a document in this format you can guarantee that you'll get what you expect. Every major word what you expect. Every major word

processor, without exception, supports RTF fully. If you have to send a highly formatted document to someone and you're not sure which format to use, choose File, Save As and then select Rich Text Format from the list.

Spreadsheet Secrets This is the origial "killer app," so why is it so hard to get information from one place to another? Probably because every developer tasks such a different approach when it comes to formatting and formulas. If you have to to formatting and formulas. If you have to have two choices. Neither one is likely to produce perfect results.

The original Lotus 1-2-3 format, W.S. or WR1, is the lowest common denominator. You get all the numbers, most simple formulas, and basic formatting like column widths. But you'll have to settle for one sheet at a time. In this format, Microsoft Excel workbooks and the tabbed multiple sheets in Lotus 1-2-3 Release 5 will get broken up Humpty Unmpty-style, and whoever's on the receiving end will have to put all the pieces back together again.

The only way to save multiple sheet workbooks is by using one of the latest file formats from Lotus Development or Microsoft. Unfortunately, neither of them is up-to-date. Excel handles 1-2-3 Release 3 files, but can't count any higher. Lotus 1-2-3, meanwhile, is OK with Excel 4-0 workbooks (which use the XLW extension), but chokes on Excel 5-0 workbooks (which, confusingly, revert to the XLS extension). When you open an Excel workbook in 1-2-3, only worksheets, macro sheets, and Excel 4-0 macro sheets make it across the wall: Visual Basic modules and dialog boxes get left behind.

Database Decisions Today's database can handle complex graphical objects like pictures and video clips. Fortunately, though, most of the data that's sitting around in your organization probably consists of unformatted text and numbers. And sharing those collections is a snap. You have two easy choices, depending on whether you're making a one-time translation or planning to reuse the stored data.

For easy imports, drop straight to the lowest common denominator, commadelimited ASCII. This format is known by various names, including comma-separated values (CSV) and delimited text. Whatever you call it, it's easy to understand: Every

The Only Thing That Matters More Than What They Think—







SCORECARD	AMERICA ONLINE CROSSES THE FINISH LINE FIRST						
Factor	America Online	CompuServe	Prodigy				
1. Exchanging E-Mail Weighing Factor: 35%	* * * * Easy to navigate, attach files, and go.	* * * Step-by-Step instructions, but too cryptic.	** Road closed to other online services without add-on software				
2. Downloading Files Weighing Factor: 20%	*** Straightforward and user-friendly.	***½ Lots of files; hard to find among forums.	* * ½ Needs better search capabilities.				
3. Accessing Data Weighing Factor: 20%	**** Top choice for up-to-date information.	* * * Unmatched depth of information.	* * * Testers rated these sections highly intuitive.				
4. Accessing the Internet Weighing Factor: 15%	* * ½ The only one with true Internet access.	*½ No Internet info, and even sending mail is tricky.	*½ Only Internet info is a glossary and a BBS.				
5. Working Offline Weighing Factor: 10%	* * * * Easy to com- pose mail offline.	* * * Need Navigator software to work offline.	*½ No can do without new software.				
Verdict 100%	**** So Easy, it's hard to believe you're online.	* * * Database depth, but not always easy to use.	* * Rock-solid for data, but that's it.				

Is What You Think

PC Computing Magazine, September 1994

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BEFORE AND AFTER

IMPORTANT DATA GETS LOST IN THE TRANSLATION

One-Way Street: The fancier the worksheet, the more you're likely to lose in the translation from Lotus 1-2-3 Release 5 to Microsoft Excel 5.0. Spreadsheets, unlike word processors, don't share a common rich data format. Without that common ground, your hard work is lost.

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Transportation Tol	al I						-	

Beauty: This Lotus 1-2-3 Release 5 worksheet contains formulas, formatting, macros, and lookup tables stored in three separate sheets. When we saved it as a Microsoft Excel workbook, Lotus 1-2-3 warned us that 10 formulas would be lost.

			icrosoft					
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Beast: When we opened the same worksheet file in Microsoft Excel 5.0, not only did we lose formulas, but we found several errors, awkward formatting, and a mostly useless file that needed to be recreated if we wanted to use it in Excel.

item in each column or field gets translated into text. If there are mbedded spaces, the data gets surrounded by quotation marks. Every field is separated by a comma, and each record ends with a carriage return. Any database worth its salt imports and exports delimited ASCII files easily. You'll lose indexes and relational links stored in data dictionaries, but those ean be recreated fairly easily.

If you want to use the same data file in two or more databases written in different applications, your best choice is the DBF format. Originally developed for dBASE, this is as close to a lingua franca as you can get. You could look on every shelf of every Egghead store in the galaxy and not find a database management program that doesn't understand dBASE (or xBASE, if you want to be politically correct about it). For one-time data transfers, just import a DBF table into your application. But most database applications also allow you to attach a DBF file and treat it as though it existed in the native format. In Microsoft Access, for example, choose File, Attach Table and pick one of the dBASE or FoxPro options (both use the DBF format). Borland's Paradox works the same waythis is not surprising, since Borland

International owns dBASE as well. And Lotus Approach doesn't make you choose, since it stores data in DBF format by default.

Graphics Even the most highly evolved Babel Fish would have trouble with all the graphics formats available to Windows and Macintosh users. So let's skip past all the vector-vs.-raster confusion and cut to the two simple choices:

For anyone who adheres to the KISS principle (Keep It Simple, Stupid), the best choice is bitmap (BMP) or Paint-Brush (PeX) format. Neither one is particularly compact or elegant, and they don't scale well, but it would be difficult to find an application—DOS, Windows, or Mac—that couldn't easily handle these lowest-common-denominator formats.

For more complex graphics that may need to be reused or resized. Windows Metafiles (WMF) are by far the best choice. By definition, any Windows application includes support for this format, which is a way of recording instructions to the Windows Graphical Device Interface (GDI) for later playback. If your image editor doesn't have this choice on the File, Save As menu, try simply cutting and pasting the image; the Windows Clipboard uses metafiles to pass images from one application into another seamlessly.

Maybe in some parallel universe, there's a world where everyone uses the same applications to create files that look the same on every desktop. It sure isn't this one. So long, and thanks for all the formats.

PCContact GRAPHIC CONVERSION

Image Alchemy If you think there are too many word processing or spreadsheet formats, wait till you see how many graphics formats there are! But one program can handle them all. Image Alchemy is an amazing DOS-based utility that supports dozens of formats. whether they're DOS, Unix, or Mac files-even PostScript! Download IMGALC, ZIP, the shareware version of Image Alchemy, from PC Contact's data library 2 (DOS Utilities). See page 316 for downloading information, or call (800) 426-3475 to order the disk from Public Brand

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Your Own Toolkit True to the Lotus way, Freelance Graphics' SmartIcons (see "Brilliant Buttons," at right) present you with an effortless, no-nonsense way to create customized toolbars. Load up your toolbars with the tools you use most often for those tricky activities (such as charting), and you're ready to roll.

You can add some helpful graphical guides and shortcuts to your screen by choosing a few simple options (see "Rules of Text" and "Function Precedes Form," at right), Rulers are especially useful for presentations that require absolute precision.

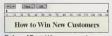
Have It Your Way Freelance Graphics also offers plenty of ways to set options once-exactly as you like them-so you never again have to remember what you prefer or how to set it up. Set up automatic backup options, and select the default units of measurement (see "Protect Yourself" and "Measure the Difference," at right). Once you've configured your customized options, Freelance Graphics functions as a seasoned veteran employee who knows your style.

KYLA K. CARLSON

GUIDED TOUR TWEAK FREELANCE GRAPHICS JUST SO



Brilliant Buttons: Configure your Smartlcons (Tools, Smartlcons) to include your favorite features. Then you can make various sets of icons available by going back to the same dialog box and highlighting the toolbar name that suits your task.



Rules of Text: When you need your text to fit within a specific space on a page, use a ruler as a guide, Under View. View Preferences, mark the Text block ruler option. Each time you click on text that you want to edit, the context-sensitive ruler will pop up.



Protect Yourself: Freelance Graphics' User Setup dialog box (Tools, User Setup) lets you configure your Auto timed save and Backup options. It also lets you set the view in which you would like the application to start, as well as enable and disable the Undo feature.



Bullets with Style: You don't have to settle for boring round bullets. From Text, Bullet, choose Style for a list of options. To take that one step further, click on Symbol and choose a shape or design from more than 50 categories.



Function Precedes Form: Sometimes using function keys is faster than using menus and dialog boxes. From View, View Preferences, click on Function key panel.



Measure the Difference: Just hecause Freelance Graphics defaults to millimeters as a unit of measurement doesn't mean you have to, Under View, Units & Grids, choose your preferred unit of measurement, in addition to handy grid options.

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SURVIVING A NEW CORPORATE STANDARD

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ost workplaces find that creating standards saves everybody a whole lot of heartache. You get a standard PC with a standard modem, standard monitor, and standard software. With standards, you know that if you sit down at somebody else's computer, it'll behave the same as your own. Once you learn this setup, it's yours for life.

Or at least until someone takes it away. That's the problem with corporate standards: They're so darn fickle. You get some new hardware, and, what the heek, upgrade all the applications to their Windows versions. Or your company hires a new 1S director who, after a lengthy cost-justification presentation and a three-marrini bunch, brings in a new batch of applications.

Either way, all the user's in your organization must be trained to use a new application, and it's up to you to make the transition fast, painless, and inexpensive. The first step in training is to decide how to introduce the new software to the users. Since we're talking about programs they use every day, the most important factor is minimizing the impact on productivity.

Two Paths Diverge Learning a new program can be as traumatic for some users as quitting smoking. People develop strong psychological ties to the applications they use and are often content to stick with an "inferior" application because it's familiar.

One way to ease the pain is to let them work in the old familiar application for a few hours a day, and use the new one for increasingly lengthy periods. This may introduce an element of confusion: "Do we press Ctrl-Q or Ctrl-W?" "Is it F7 or Shift-

F1?" The more proficient users are with

the old program, the greater the confusion. Another method may be described as the cold-turkey approach. Set a deadline for the transition and remove all traces of the old application from the system by that date. This ensures the complete transition to the new application, and while some users may struggle and complain, the reality of the situation will convince them to led go of old habits and learn the new program as fast as they can. Of course, you'll probably spend a couple of weeks running, a trauma center, too.

No matter how you plan to make your transition, there will be some period of decreased productivity. Count on it, and try to schedule the changeover for a non-critical time. For example, the last week of your fiscal quarter would be a bad time to introduce a new accounting package. Unless you like mayhem.

Determining Factors When you look for the most effective training method, there are three things you should

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Just Press Play: Having decided to standardize on Microsoft Office, the California Franchise Tax Board (see "Painless Transition with the Right

Training Method," page 202) chose Anderson Soft-Teach's training videos as the modeflective way to go. There's no Office video package per se, but the videos include a Word and an Excel offering. The videotapes are well-structured, and they include a practice disk with all the necessary files accompanied by workbooks for hands-on practice and review.

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Anderson and J3 Learning concentrate on corporate



clients, while ViaGrafix is widely sold at retail stores.

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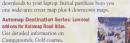
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WORKING SMARTER: Training & Support Changing Standards Doesn't Have to Be a Traumatic Event

take into consideration: Time, money, and available resources.

If time is of the essence (say there's a corporate transition deadline) look for crash-course solutions that cram as much information as possible into a short period. While crash courses aren't as comprehensive or cost-effective as other methods, they usually get users up and running in short order. Look for one- to three-day courses. See if you can negotiate a customized program with the course instructor to meet your organization's specific needs.

If your budget prohibits extensive training programs, consider a recyclable method, such as video, audio, or computerbased training. Though often less effective than an instructor-based solution, these programs stretch your training dollars.

If you don't have a classroom, or a place where a group can watch a training video, you may have a resource constraint. You can often circumvent such problems by using conference rooms as classrooms or by paying people to get together in the evening to run through a training video at somebody's home. Just don't plan to bring teachers onsite if you

Failing to reach a decision on the best

have nowhere to put them.

Assess Your Success Regardless of is one thing you must do: Design a follow-up procedure (or post-testing) to

training method, some organizations elect

to send employees to local training centers

the training method you decide on, there

establish the effectiveness of the program.

on company time.

ROI VIDEOS FREE INSTRUCTORS FOR OTHER PROJECTS



Demand: Investing in the Anderson Soft-Teach training videos has saved an oil company hundreds of classroom instructor-hours per year. The company saved even further hecause the instructor was freed for other

Video on

This should be done immediately following the training, and then (at the very least) one month later and again six months later. Users often seem happy with the instructor or the instructional program and rate the training very highly. but will exhibit poor retention a few months down the road. YAEL LI-RON

projects.

WAR STORIES

PAINLESS TRANSITION WITH THE RIGHT TRAINING METHOD

The Tale of the Frugal Tax Collectors, Sacramentobased California Franchise Tax Board has standardized on Microsoft Office as its business application suite. According to Jackie Martin, project analyst, there were numerous word processors and spreadsheets in use by different divisions, some DOS-based, others Windowsbased. The motivating factor in the decision to implement a new standard was new hardware. (They'd purchased 300 PCs, and the time was right to upgrade to Windows.)

The training solution accepted by all six divisions was Anderson Soft-Teach's videotapes. Each division evaluated the program for two weeks, and the Tax Board also conducted a cost analysis that pitted training consultants against the Anderson solution. The advantage of the Anderson program was clear: This was a resource that could be accessed by new learners over the next months at no additional cost, especially since time would not be not a factor in this transition. From Office to SmartSuites in No Time Flat.

MCI's Bay Area Sales Branch Office needed a new suite standard to go with OS/2. Since Microsoft doesn't make an OS/2 version of its Office suite, the choice was clear:

Lotus SmartSuite, which does offer an OS/2 version. According to Bill McClellan, systems administrator, the new software was installed in March 1994; between March and June, both suites were in use to ease the transition. All traces of Office were permanently removed from the system in June, by which time a training program had been implemented.

The Corporate Training Department had designed a self-study program that included handbooks, reference guides, and workbooks. Each training module was designed to take about 15 minutes. It was a wellstructured program, but as it turned out, it was impossible to motivate employees to take the time and go through the program on their own, McClellan's office decided to outsource. The Martinez Adult Business Training Center in Martinez, California, was contracted to conduct a threeday training program on Lotus 1-2-3 and Ami Pro. In that period, 45 employees went through the program, at a cost of \$35 per person per day. This was an inexpensive way to get people up and running with new software as soon as possible. The outcome has been satisfactory and most users have demonstrated a smooth transition.



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GET DOWN 'N' DIRTY RECONCILING YOUR INVENTORY

A Reality Byte for Access' Northwind Traders

was tooling along one of those badly surfaced back roads—some folks call them "blue highways" because they're always drawn in blue on road maps. All of a sudden I rounded this blind curve and ran smack-dab up against an old truck. I mean, this guy was doing maybe ten miles an hour. Oncoming traffic zoomed by—no chance of passing.

I squinted a bit in the sun and saw that the back of the truck was packed with... chickens! Hundreds of the suckers, squawking and pecking and raising all sorts of Cain, loose feathers swirling in the wake of the truck's slow progress.

All of a sudden there was a loud POP! and a cloud of black smoke oozed out of the truck's tailpipe. The engine seized with a clatter, and we both came to a complete standstill. I could see the guy in the truck kick a tire as he propped open the hood.

I walked up to him. Man, what a rube. Hadn't shaved in a week, or bathed in two. And he's swearing a blue streak. So I try to act friendly, ya know, and I say to him, "Jeecez. That's quite a load of chickens you got. How many of 'em are back there?" He pauses for a few heartbeats.

"See," he says, and shuffles back into the truck. I move around to the side of the rusted relic, trying to see what he's doing there in the cab. "Fer hunnert an seventy three hens," he shouts over the traffic, "an three hunnert an ten roosters." He looks up, catches me pecking at him. "Hell's the matter with you, boy?" he says. "I got the numbers on this here Think'Pad. You never seen a computer before?"

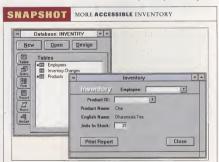
Ah, Inventory Systems This month we'll try to convince you to break the shrink-wrap on your copy of Microsoft's Access by giving you a useful adjunct to one of the demo programs that ships with it—the Northwind database—along with step-by-step instructions for getting it to work.

Access ships with several useful sample datasses, including a cool inventory program for a fictitious company called Northwind Traders. But there's a gaping hole in this program that drove us to distraction. Most companies take a physical inventory at least once a year—a reality, check, as it were, to make sure the computer's Units in Stock number matches physical reality. Reconciling the computer's inventory with the real thing usually involves two steps first, a trusted employee has to go in and change the Units in Stock numbers; and second, the bottom-line value of inventory has to be calculated—it's the number everybody stays up all night to see. The Northwind Traders database will let you mess around with the Units In Stock numbers, but in the real world any competroller worth his or her salt will insist on an audit trail—a detailed record of who made

what changes to the numbers, what the numbers were before the change, and where they stood after the change.

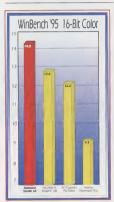
We've written an add-on to NWIND.MDB called INVENTRY MDB that tackles these problems. From the user's point of view, this is pretty simple. Open the INVENTRY-.MDB database, and an inventory reconciliation window pops up. Select your name from the offered list of employees, then pick and choose each product by its unique ID, updating the Units In Stock number if necessary. When you're done, click on the Print Report button, and the Comptroller's report comes out. It's far from a highsecurity solution, but it beats a poke in the eve with a sharp stick-a good working definition of what most comptrollers would dole out, faced with an unaudited manual change in inventory figures.

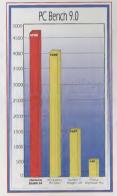
If you don't feel like typing, see page 316 for information about downloading NW_INV.ZIP from PC Contact's data library (Windows Applications). This file includes a summary inventory valuation report that



Balance the Books: The final INVENTRY.MDB application is used to manually reconcile a physical inventory with the inventory maintained by the computer. A trusted employee makes changes to the Units In Stock number and then prints an audit report.

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WORKING SMARTER: Do It Yourself Creating the Reconciliation Program

we don't have room to talk about in this column. If you download it, as opposed to building it from scratch, you'll have to "attach" the Northwind database. Be sure to read the INVREAD ME file for instructions.

To Work In Access, click on File, New, and type INVENTRY.MDB. In the Database:INVENTRY window, pick Tables; click on File, Attach Table; pick Microsoft Access; navigate around to your \access\sampapps directory; and doubleclick on NWIND, MDB, Click on Products, Attach, Employees, Attach, and click on Close. There. You're ready.

You'll need a new table to keep track of items changed to reflect the physical inventory. That table needs only two fields; one for the product ID number, the other for the old Units In Stock, Next, in the Database: INVENTRY window. with the Tables filecard showing, click on New. Choose New Table. Set up the Product ID as a Number, then make it an Integer, with Indexed Yes (No Duplicates). And make the Old Units In Stock field a Number, Integer, Not Indexed. Put your mouse immediately to the left of the Product ID and right-click, choosing Set Primary Key to make the Product ID this table's main key. Hit Ctrl-S to save the table and name it Inventory Changes.

Now tell Access that the Product ID field in this Inventory Changes table actually refers to the same thing as the Product ID field it already has in the Northwind Traders' Products tables. Click on the Database:INVENTRY window, and select Edit, Relationships. Add the Products and Inventory Changes tables. Drag the Product ID entry on the left and drop it on top of Product ID on the right. That establishes the link. Close the Relationships window (just double-click on the hyphen-thingy at its upper left corner), and save the changes.

Now, for the Form that lets you change Units In Stock numbers, Back in the Database:INVENTRY window, click on the Forms filecard and hit New. Up where it says Select a Table, click on the down arrow and pick Products. Hit the Form Wizards button, select Single Column, and click on OK. Select each of these fields, in turn, to include on the form: Product ID, Product Name, English Name, and Units In Stock, Click on Next>>. Choose the embossed style and click on Next>> again. Type in the name Inventory, pick "Modify the form's design," and click on Finish.

SUPERSCRIPT THE INVENTORY PROGRAM

These Access Basic programs make INVENTRY.MDB work. To start, go into Database: INVENTRY, click on Forms, Inventory, Way up on the menu, click View, Code. Pick from the two drop-down lists to go through the controls and events. Type them in as follows:

In (general) (declarations):

Option Compare Database 'Use database order for string comparisons Dim OldNumber%, NewNumber% 'Holds the values of old and new " ⊆Units In Stock

In Form Load:

Sub Form_Load () ' Clear out the [Inventory Changes] table Dim MyDB As Database, MySet As Recordset Set MyDB = DBEngine.Workspaces(0).Databases(0) Set MySet = MyDB.OpenRecordset("Inventory Changes", " CDB OPEN TABLE) On Frror GoTo NoRecords MvSet.MoveFirst Do Until MySet.EOF MySet.Delete MvSet.MoveNext

Loop Exit Form Load: MvSet,Close

Me![Employee].SetFocus Exit Sub NoRecords:

Resume Exit Form Load End Sub

In Product ID AfterUpdate:

Sub Product_ID_AfterUpdate () DoCmd ApplyFilter , "[Product ID]=Forms![Inventory]![Product ID]* Me![Units In Stock].SetFocus

In Units In Stock Enter:

Sub Units_In_Stock_Enter () OldNumber% = Me![Units In Stock]

In Units In Stock AfterUpdate:

Sub Units In Stock_AfterUpdate () Dim MvDB As Database. MvSet As Recordset NewNumber% = Me![Units In Stock] If NewNumber% <> OldNumber% Then 'Store Data in [Inventory Changes] table

Set MvDB = DBEngine.Workspaces(0).Databases(0) Set MySet = MyDB.OpenRecordset("Inventory Changes", " GDB_OPEN_TABLE)

MvSet.Index = "Product ID" MySet.Seek "=", [Product ID] If MySet.NoMatch Then

Continued on page 208

Save the new form by hitting Ctrl-S, and name it Inventory. Put the mouse pointer just above the Form Footer bar and drag it down a bit to give yourself some breathing room-the two buttons go down there.

Let's lock out parts of the form so the user can't screw around with things any more than necessary. On the form, rightclick on the Product Name text box, pick Properties, and change the Locked property





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to Yes. Do the same for the English Name text box. Finally, disable the usual navigation stuff by right-elicking in the area below the Form Footer bar and in the Properties window, changing Record Selectors to No and Navigation Buttons to No.

Right now the form has a text box for the Product ID-requiring you to type in an ID number. Let's give you a drop-down combo box that lets you either type in the number, or choose it from a list of existing numbers. Click on the Product ID text box and hit Del. Get the Control Wizard going, click on View, and make sure there's a check mark in front of Control Wizards. In the Toolbox, click on the Combo Box tool (it looks like a regular Windows dropdown combo box). Go to where the Product ID text box used to be, and draw in a Combo Box. The Combo Box Wizard pops up. Click on "I will type in the values that I want," click on Next>>, type in 1 for a one-column display, and click on Next>> again. Choose "Remember the value for later use" and click on Next>>. Change the label to Product ID: and click on Finish, You

SUPERSCRIPT INVENTORY PROGRAM, THE SEQUEL

Continued from page 206

MySet. AddNew
MySet![Product ID] = [Product ID]
MySet![Old Units In Stock] = OldNumber%
MySet. Update
Else
If NewNumber% = MySet![Old Units In Stock] Then
MySet. Delete
End If
End If
Mel[Product ID].SetFocus
End Sub
In btnPrint_Click:
Sub btnPrint_Click ()
Me. Requey
Mel[Product ID].SetFocus
DoCmd OpenReport "Inventory Report", A_DESIGN, "Inventory Li

Me.Requery
Mel.Product IDJ.SetFocus
DoCmd OpenReport "Inventory Report", A_DESIGN, "Inventory List"
Reports![Inventory Report]![Employee,LCaption =
Forms![Inventory]![Employee].Column(1) & " &
Forms![Inventory]![Employee].Column(0)
DoCmd OpenReport "Inventory Report", A NORMAL



End Sub

can stretch and move the box as desired.

You'll need another combo box up at the top of the form so each employee can pick his or her name from the list of employees, Again, go over to the Toolbox and click on the Combo Box tool, Draw a Combo Box in the Form Header section Once again, the Combo Box Wizard will appear. Choose "I want the combo box to look up the values in a table or query" and click on Next>>. Select the Employees table and click on Next>> (if you get a weird message, 15 fields is OK), Click on Next>> three times, selecting the defaults. Choose "Remember the value for later use" and click on Next>>. Change the label to Employee: and click on Finish.

Now you add the two buttons to the form. Click on the Command Button tool in the Toolbox and draw a button near the bottom right of the form. The Wizard appears. On the left pick Form Operations; on the right pick Close Form. Click on Next>>. Choose to display Text and change it to Close. Click on Next>>. Name the button bttclose and click on Finish. Draw another Command Button in the lower-left corner. Choose Miscellaneous and hit Cancel. We'll write code to handle this one ourselves (see "The Inventory Program," page 206). Right-click on the Command Button and change the name to bittp'int and the caption to Print Report.

The Inventory List query shows products in the Inventory Change table. Back in the Database: INVENTEX window, pick the Query filecard, click on New, New Query. Add the Products and Inventory Changes tables. Click on Close Click on the down arrow next to Field and pick Products. Product ID. Move to the next column and pick Products. Product Name, then Inventory Changes. Old Units In Stock, and finally Products. Units In Stock, Hir Cirl-S and save the ourver's Inventory List.

Finally, the Inventory Report—the audit trail—is just a Wizard away. In the Data-base:INVENTRY window, click on the Reports filecard and then on New. Pick the Inventory List query and click on Report Wizards. Choose Tabular and click

on OK. Select all the fields and click on Next>>. Choose just the Product ID field for sorting and then click on Next>>. Use the Executive report format and click on Next>>, Change the name to Inventory Report, check the "See all fields on one page" option, click on "Modify the report's design," and click on Finish. There's no need to show totals, so down in the Report Footer section, click on each of the =Sum() fields, one at a time, and hit Del. In the Report Header you need something that says Employee: John Smith, so use the Label tool in the Toolbox to add a label with the caption Employee and another label with the caption Unknown. Right-click on the Unknown label, go into Properties, and change the name to Employee.

Save everything, and the next time you open INVENTRY.MDB, your new system will uh hatch

WOODY LEONHARD & VINCENT CHEN

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OUR TECHNICAL STAFF RESPONDS

Questions, Answers, and Tips

rying to get 32-bit access to work but encountering 32 errors too many? We show you how to fix it—or at least explain why your system seems a *bit* confused. We'll even explain 386-Enhanced mode and how TEMP drives work. Plus we answer questions about DOS, Windows, and hardware, and share tips and tricks for your favorite applications.

ACTIVE ACCESS

Question: When I try to turn on 32-bit disk access in Windows, the option is grayed out, and the virtualmemory dialog box indicates that virtual memory is using the BIOS. My dealer says that this is normal because the system is 32 bits wide. Is that correct, and is there a test I cam perform to verify that 32-bit disk access is active! Is my system effectively using SmarDrive!

LEE GORDON

Answer: Windows for Workgroups includes one virtual device driver for 32-bit disk access—WDCTRL—designed for controllers that are compatible with the Western Digital 1003 interface standard. This includes most but not all IDE controllers.

Most SCSI and ESDI controllers, however, are not compatible with this command set. If your controller is not compatible with this command set, the option will be grayed out and you will not be able to enable this option. But all is not lost: Check with the controller manufacturer to see fit has a special driver that will enable this feature.

POWER STRUGGLE

Question: I've heard that 32-bit disk access is not compatible with the power conservation programs that slow down the hard disk in most portables. I assume that if I turn off power conservation, I won't have a problem. Could you explain why portables can't or shouldn't use 32-bit disk access?

Frank Page Iakarta, Indonesia

Answer: When you enable 32-bit disk access, Windows retrieves data from the system's hard disk(s) using an Enhanced mode virtual device driver (VxD), which accesses the controller hardware directly. To function correctly, the disk controller must be completely compatible with the standard Western Digital hard disk controller architecture. In most cases, the Windows Setup and the VxD's own initialization code properly detect controllers that are not 100 percent compatible with the Western Digital standard.

The disk controllers used in portable computers are very similar to Western Digital controllers, but they have extensions used for power management. These include extensions for shutting down the disk drive when it hasn't been used for a while or for placing the machine in Suspend mode (typically by pressing a Suspend button). Some systems, such as Tandon notebook computers, change the state of the disk controller when the power source is changed from the wall plug to the battery. Basically, the power management support can change the state of the disk controller without notifying Windows about this change.

Since there is no standard for this hardware, the 32-bit disk driver cannot determine when powermanagement events occur or what to do about them. If the driver determines the controller is in a different state from what it expected, it will produce an error message. If you get this message, you should turn off 32-bit disk access.

If Windows cannot be started in Enhanced mode while 32-bit disk access is enabled, Windows should be started with the command line

VIN /D : F

This switch temporarily disables 32-bit disk access. You should then permanently turn off 32-bit disk access by using the Control Panel's Virtual Memory dialog box. Controllers that support drive spin-down, such as Compaq's DeskPro 386N computers, should not use 32-bit disk access for similar treasons.

386N computers, should not use 32-bit disk access for similar reasons. Note: To avoid problems with these machines, 32-bit disk access is disabled by default. If the machine

CONTACT GET IN THE QUEUE

Got a question, tip, or step-by-step solution? Send it to us right away! We pay \$50 and up for tips and Step by Steps that we publish. No question is too simple or too difficult, so go ahead, challenge us. We will publish your tips on using undocumented features in any major app, and some minor ones as well. Our address is: Q&A, PC Computing, 950 Tower Lane, 19th Floor, Foster City, CA 94404. Better vet, use e-mail: CompuServe at 72241,2220; America Online at HelpPCC; or via the Internet at vli-ron@pcc.ziff.com, Or send a fax to (415) 578-7029. Don't forget to include your address and a daytime phone number.

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WORKING SMARTER: Q&A DOS: Windows: Hardware

OUR TECHNICAL STAFF RESPONDS

Questions, Answers, and Tips

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is not a portable and does not support spin-down, then feel free to enable 32-bit disk access.

32-BIT SOMETHING

Question: Every time I try to ran
32-bit disk access, I get the following
error when I start Windows: "The
Microsoft Windows 32-bit disk driver
(WDCTRL) validation failed at
phase 07,1F. To continue starting
Windows without using the 32-bit
disk driver, press any key."

I have a Gateway 2000 Pentium P5-66 system with a 540MB Western Digital hard drive running Windows for Workgroups 3.11 and DOS 6.21. Can you tell me how I can avoid the 32-bit error?

> VINCENT FISHBAUGH SALT LAKE CITY, UTAH

Answer: When you run Windows for Workgroups 3,11 with 32-bit disk access enabled on a Gateway 2000 P5-60 with a \$40MB IDE drive, you may receive a message that's similar to the followine:

"Microsoft Windows 32-bit disk driver (WDCTRL) validation failed at phase 03,OF."

This message also pops up on the Gateway 2000 p5-66 at phase 07,1F. This situation occurs if your CMOS drive configuration settings are set to AUTO-CONFIG.To correct this problem, you have to manually set your CMOS drive configuration parameters. Check your system's user guide for how to configure CMOS settings. Unfortunately, there's no universal CMOS configuration procedure that we can offer here.

BREAKING THE CODE

Question: I'm trying to follow the examples of code you've published, in various previous issues, for writing a batch file. But I'm not sure how you handle the following symbols: ¬

BARKY RYAN

TACOMA, WASHINGTON

Answer: We tried our best to come up with a visual icon that depicted a

STEP BY STEP

A MAP TO LOTUS 1-2-3 RELEASE 5

Not everyone knows that Lotus 1-2-3 Release 5 offers a handy map feature. This makes it easy to create a map that uses colors to illustrate state-by-state statistics. Lotus 1-2-3 automatically recognizes state names and knows how to organize them.



1. Columnize: Put your state data into a two-column range. (This example includes data for the 48 contiguous states, plus the District of Columbia.) Select the entire range. Do not, however, include the column headings at the top in your selection: If you do, 1-2-3 will interpret them as state names.



2. Oh, Goodie: Display the Goodies Smartlcon set and click on the New Map tool. (Alternatively, you can choose

Tools, Map, then choose New Map from the submenu that appears.) This transforms the mouse pointer into a spining globe. Click in the upper-left corner of the worksheet where you want to place the map.

3. Title: The resulting map has the uninformative title, "USA by State." To remedy this, choose Tools, Map, then choose Ranges & Title from the submenu that appears. In the Ranges & Title dialog box, click the Cell check box, enter A1 in the Title box and click no D.



Colorize: The label in the selected cell provides the map title text, as shown here. Lotus 1-2-3 automatically divides the states into six strata and assigns a different color to each.

RALPH SOUCIE WINTERPORT, MAINE

"wraparound" of characters. These symbols indicate that although the code appears to break into two or more lines—as represented in the columns on PC Computing's pages—the reader should type in the code as a single line.

VIRTUAL ACCESS

Question: Thanks for printing the Windows Superguide in your October 1994 issue (page 101). It ironed out all the rough spots in my setup. But I still have a question: What is 386-Enhanced mode?

> NAME WITHHELD VIA COMPUSERVE

Answer: Windows 386-Enhanced mode is the normal operating mode for a system that has a 386 or later processor. It allows Windows to access virtual memory—which means more memory than what is physically installed in the machine. It also provides a means for Windows to multitask non-Windows applications and run DOS applications in a window on the desktop alongside other Windows applications.

JUST SAY ICON

Question: Is it possible to change the minimized icons for Program Manager groups? It would be so

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much easier on my eyes if I could plance down and recognize a fax machine icon to tell me where my communication programs are located.

> ROBERT T. BAXTER RATHDRUM, IDAHO

Answer: That is not an option with Windows as it comes out of the box. However, there are some thirdparty applications that allow you to change the group icons on your desktop, Our favorite is Plug-In Version 2 from Plannet Crafters, For information, contact the company at (404) 998-8664 or (800) 651-1000.

NOT SAFE TO A POINT

Question: I have received conflicting advice about pointing the TEMP variable to a RAM drive. Is this something I can safely do?

MADHAY G. WELLING SHERMAN OAKS, CALIFORNIA Answer: The reason you get conflicting answers is that there are two ways of looking at this issue. You can set your TEMP drive to point to a RAM disk to increase performance, since RAM access is faster than hard disk access. In addition, when your system locks up, you won't get stuck with cryptic TMP files on your hard disk because these files will get erased when you exit Windows, or when you finally turn your computer off.

However, the extra memory would be better used to increase SmartDrive or 32-bit file access under Windows for Workgroups 3.11.

KEEP ON UPGRADIN'

Question: I recently upgraded my computer from a 386DX to a 486SX. Is there any way I can use the 386's math coprocessor to turn the 486SX into a 486DX?

> WAYNE EDWARDS COLORADO SPRINGS, COLORADO

Answer: Unfortunately not, When a 486 processor offers a math coprocessor, it's built inside the chip-alongside the processor unitto improve performance. In the 486SX, the math coprocessor has been omitted altogether to reduce cost. To add a math coprocessor to a system with an Intel 486SX chip. you must install a whole new chip. which includes both the processor and the math coprocessor unit. This plugs directly into a socket on the system board, next to the existing processor in the system.

MIGHTY MODEM

Question: I'm about to move to Russia, Can you recommend any brands or models of modems that would be tough enough to stand up to Russia's faint and noisy phone lines?

Peter Aronson GERMANTOWN, TENNESSEE



Answer: Any modem manufacturer who wants to sell a modern for use in a country outside the United States must have its modem certified by that country's phone company. This is because many European countries have different line voltages and connectors, and their phone subsystems could be damaged by unauthorized equipment sending power down the wrone lines.

You should look for modem manufacturers with experience selling in the international markets. We suggest contacting U.S. Robotics, a company that has sold moderns in the Russian market for many years. Check out the popular Sportster and Courier models.

Compiled and edited by James Cury. Additional technical assistance was provided by Matthew Lake, Yabe Li-Ron, Adam Meyerson, Scott Naylor, and John Taschek.

HOT TIP

LAUNCH TWO APPLICATIONS WITH ONE ICON

Problem: You want to have one icon run two Windows programs.

Solutions: Use Windows Recorder to create a macro, then run the two programs from the icon for that macro. Open the Accessories group and double-click on the Recorder icon. Select Macro, Record and type in a descriptive name for your macro. Under Shortcut Key, enter the letter D and click on Cut. Select Playback to: Same Application and Playback Speed: Recorded Speed, then click on Start. From this point until you type Cttl-Break, everything you type is part of the macro. Press Alt, then F, R. Type in the path and command for the first application you want to run, such as C:WINWORDWINWORD.EXE. Press Cttl-Esto tad lup the Task Manager. Select Program Manager, press Alt, then F, R and type in the name of the second application, such as C:APCPLUSPPCPLUS.EXE. Go back to Program Manager again, and press Cttl-Break to stop recording. Save the macro and then save the file with the name C:WINDOWSZAPES, REC.

Next, create a Program Manager icon for it. Let's put it into the Main group: Open the Main group and select Flie, New, Program Item. Under Description, type Run Two Apps, under Command Line, type RECORDER-H
20 C-WINDOWSY2APPS.REC. Click on OK. When you double-click on the Lun Two Apps icon, you'll launoth Word for Windows and Pro-Comm Plus.

DUBLIN, OHIO

There's no law that says you can't find a better way of doing things. Just ask an attorney. "By switching to Microsoft?" we've reduced our training time," says Managing Partner Tim Klashke." Our attorneys as well as our temps can begin using Microsoft Word right away, even if they're used to other software." Why? Because of Word's intuitive icons and special help functions. Like its Help for Word'Perfect." Users feature, which automatically tells you the corresponding



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Help: Buying Smarter

The Quantum Leap to Data Recovery

time machine would be the perfect backup system. Ideally, as soon as the embers of your now-burned-down office have cooled, you'd simply dial into yesterday, tuck your PC under your arm before you leave the office, and wait for today to come. Until time machinery makes it to market, though, you'll have to depend on a

backup system to prevent simple PC problems from becoming disasters. Although hard disks are more reliable than ever, unexpected demons lurk nearby, waiting to corrupt your files and data. They come in the form of mistyped delete commands, viruses, thieves, natural disasters, and all the other poternial nightmaares that rob you of sleep.

But backing up is a drag, particularly when you oversee several PCs. So you secrifice your creative work to make copies of work you was a bready completed—copies you may never look at again. Fortunately, there are many kinds of backup technologies, and at least one of them will match your working style. Your choices include floppy disks, duplicate hard disks, carridge disks, magneto-optical disks, CD-ROM (and other WORMs), quarter-ind-carridge (QIC) ape, data carridge tape, helical tape IDAT and 8mm), and tape libraries.

Classic among backup systems is the requires nothing new. Almost every PC has a floppy drive, and backup software comes with DOS. However, although the media are cheap, today's preferred 1.44MB floppies aren't suitable for backing up 200MB to 400MB hard disks. One full backup would require several hundred floppies, several hours, and health risks—like tennis elbow from changing floppies, or lacerations from putting your foot through your monitor when the session aborts on disk number 302.

A faster solution is a second hard disk drive. With disk mirroring software or a mirroring controller, such as the Distributed Processing Technology (DPT) Smart-Cache III Model PM2122, which combines a Fast SCSI-2 interface and an EISA bus connection, the second hard disk becomes a RAID 1 disk array. Higher RAID levels (4 and 5) secure information in a more efficient manner, improving performance and letting you operate without data loss, even when one of several drives fails.

Disk cartridges such as the fast floppylike Bernoulli MultiDisk Insider 150 from Iomega Corp. (150MB per cartridge) or the SyQuest Technology SyQuest 270i (270MB capacity) give you the fast access of hard disks in cartridges that you can store offsite or use as an exchange medium.

Magneto-optical (MO) cartridges are slower, but widely supported. Big 5.25-inch cartridges like the Pinnacle Micro Sierra 1.3GB store more than a gigabyte per disk, while pocket-size 3.5-inch cartridges like Pinnacle's Tahoe 230 pack 230MB per disk.

Some backups must be immutable as well as secure, to preserve archives or evidence, for example. A recordable CD-ROM drive is suitable for that kind of backup.

Staple Media Tape cartridges have long been the backup standby because they are inexpensive, reliable, and easy to use. One cartridge can back up an entire

SITE ANALYSIS

OVERCOMING THE FLOPPY-DISK

Backups are more than routine for Tom Dixon, technical support administrator for Mortgage Information Corporation in San Francisco. They are his company's livelihood. To supply mortgage databases to the company's clients, Dixon makes

backups, which the clients restore to their own machines.

For years, Dixon relied on floppy disks. Although straightforward, the floppy backup process was hardly convenient—his database was huge. "Even after compressing the data, we'd have to spread 60MB across

"Even after compressing the data, we d nave to spread built across floppy disks," says Dixon. "We'd spend half an hour to 45 minutes making a batch of disks for each client, and quality control would double that."

And the clients didn't like the floppy-based system. They had to restore each floppy, so updating the database took forever. And they had to commit half a day to the project, providing they didn't come up with a CRC (cyclical redundancy check) error." A single error on any floppy in the backup session rendered the entire SOMB unusable.

After investigating tape backup, Dixon wasn't impressed. "Nine-track was as bad as floppy. You can get a twist in the middle of a tape, and static electricity can wreak havoc." he explains. "We tried magnetic media-8mm tape, 3480 tape, and DAT." Moreover, switching formats meant clients would have to make expensive investments in hardware and software to control it.

The Site Solution: Recordable CD-ROM, specifically Pinnacle Micro's RCD 202. A single compact disc holds an entire database and is resistant to the ills that affect tape. Plus, it's inexpensive. Reading CD-ROMs requires no special software. In addition, a CD-ROM functions as an information server and notiguist a restoration source. (See "How tit Works," page 223.) network with minimal effort. The backup system for individual PCs has long been QIC-80 minicartridge tape. Although originally designed to store 80MB per carridge, patting 50 percent more tape in each cartridge and adding data compression has pushed capacity to about 250MB. Among dozens of drives, we like Colorado Memory Systems' floppy-interfaced Jumbo 250 and harallel-port Jumbo Trakker 250.

Today, however, the standard hard disks have grown to twice that capacity without resorting to data compression. To that end, Sony Corp. has added 68 percent more capacity by squeezing wider tape into QIC-Wide cartridges—the new "quarter-inch" cartridges shed tape measuring 8 millimeters (0.315 inch) across. The capacity of a single QIC-Wide cartridge starts at 200MB uncompressed and runs up to 46B using advanced tape coatings and data compression. Surprisingly, the wider tape doesn't fatten prices. The first available QIC-Wide internal drive is the Conner Tane-Stor 420.

Larger QIC data cartridges currently pack several gigabytes of data. Although today's cartridges top out at about 13GB, tape-maker 3M Company and drivemaker Tandberg Data are currently working together to put 25GB on a single 1,500foot cartridge with a system scheduled for introduction later this year. (See "Crossroads: QIC vs. DAT," page 188, for more information on these technologies.)

Helical Tapes Competing with QIC tapes at capacities over a gigabyte are two technologies, DAT (digital audio tape or 4mm tane) and 8mm cartridges.

The tiny, matchboxsize DAT cassettes follow one of two standards: the 1990 DDS (digital data standard), which packs up to 2MB in a 90-meter cas-

sette, or the 1993 DDS-2, which doubles speed and capacity using 120-meter cassettes. (We liked Optima Technology's MiniPak Fast 8000DAT best.) Current 8mm cartridges store 5GB to 7GB per tape; the higher capacity uses longer, thinner tapes and special drives like Exabvte Core, 's YSR-8SOSXL.

If you have more data to back up than that, you'll need a library—a robotic

HIT LIST

SAVING THE DATA

Planning ahead for data loss is easy and inexpensive, considering the alternatives.

- Equip yourself. Choose media and hardware that fit your workstyle. The expanding storage capacities of tape backup make it an especially economical choice.
- 2. Set a schedule. There's no point backing up if it's not done regularly. If you don't trust yourself to remember making backups, implement an automatic backup system.
- 3. Invest in training. Your LAN administrator shouldn't be the only hands-on expert. Train everyone to make backing up a habit. It's an investment that will pay off.

multiple-tape jukebox. A single library puts terabytes of data in automatic, near-line (electronically accessible, but not instantly so) storage using a carousel of dozens or hundreds of tapes and one or more drives. These back up your network automatically and make restorations without a human handling a tape. But be prepared to pay from \$60,000 to \$\$50,000 to \$\$





FIT MORE MEGARYTES INTO EVERY TAPE

Putting the Squeeze on Your Backup Tapes

ackup systems face a challenge as frustrating as chasing the horizon: How to squeeze enough data onto a single cartridge to back up a full hard disk. Every year or two, the disk capacity of the typical hard drive doubles, and tape vendors must follow suit. The easy solution? Put more tape in a cartridge. Or use thinner tape, a strategy that stretched

DAT cassettes from 1.38GB up to 4GB. Now try squeezing more data on the same amount of tape. Fortunately, geometry works in favor of tape manufacturers. Figuratively speaking, a data stream is one dimensional (length), while tape exists in two dimensions (width and length). As a consequence, tapes can be split into multiple tracks.

Designing those tracks on the tape isn't the big challenge. The problem is reading and writing to them with a tape head. Every track in a head requires a pole piece-a tiny electromagnet with iron laminations and a long electrical coil. Putting dozens of poles into a single head is a monumental chore-and it costs.

Luckily, it's also unnecessary. Only a few mainframe systems read or write multiple tracks simultaneously. Most PC tape drives need only one track at a time. In QIC systems, the read/write head moves up and down (perpendicular to the tape) to find each track, shifting to the next position

as the tape reaches the end of its travel. In fitting dozens of tracks across a tape, manufacturers resorted to the same technique that's used on disks-servocontrol. The drive checks for control data on the tape-data that helps the drive adjust the head position to follow each track as the tape travels.

To guarantee smooth tape flow, QIC cartridges are built with a huge aluminum armor plate to keep tape and spools aligned. A special rubber-belt drive mechanism ensures constant tape speed.

The OIC cartridge mechanism is costly, yet still doesn't squeeze in all the tracks that might fit across a tape. So some designers stole an idea from the world of videocassette recorders. Instead of packing tracks lengthwise along the tape, the helical scan method traces them diagonally and packs tracks at more than 1,500 per inch. As with high-density QIC cartridges, helical systems rely on embedded servo information to find each of these narrow tracks.

Offset Data Tracks Instead of moving the head up and down to scan the tracks, a helical scan recorder spins two heads inside a large drum, around which the rape wraps. As one head spins around the drum and across the tape, the tape moves slightly. When the first head reaches one edge, the second head starts a similar sweep at the other edge following in the first head's tracks-almost. Because the tape moves slightly in the time the first head makes its scan, the second head's traverse is offset slightly from the first.

Usually a narrow guard band separates the tracks of the first and second heads. To squeeze data tighter, some helical systems use azimuth recording, which slightly overlaps (instead of separating) the tracks. To distinguish adjacent tracks, gaps in each of the two heads are tilted in opposite directions from each other. Because a head responds most strongly when the azimuth of the recording matches the azimuth of the head, one head ignores the track laid down by the other head

The rotating head of the helical system offers another advantage. It increases the apparent tape-to-head speed, which in turn increases the frequency with which the drive can apply data to the tape, speeding up the data transfer rate of the overall system. The new 8-millimeter systems achieve the highest data rates of any tape backup system.

Error Correction As the density of the data on a tape increases, so does the likelihood that something could go wrong. But error rates quoted for tape backup systems are microscopically small-errors are less likely to occur in data on tape than on your hard disk drive.

How to Choose: The backup media you pick depends on the amount of data you generate. The more data, the more comprehensive your backup strategy should be. Minicartridges offer low-cost answers to individuals. For larger backups, DAT cassettes store more data and libraries can automate your backup routines. For backup across a LAN, you can increase your ROI with a tape carousel that automates the procedure.



The Recordable CD-ROM Solution

Need to write hundreds. of megabytes of data for playback on many PCs? Although less durable than regular CD-ROMs. recordable CD-ROMs cram data onto a disc that you can play on a regular CD-ROM drive.

> 1. Prepare to Write: The recordable CD-ROM drive translates streams of data copied from your hard disk into flashes of laser light that are focused onto a spinning recordable compact disc. The laser burns holes in parts of the gold layer inside the disc. The holes (called pits) and intact portions of the coating (called lands) represent the 1s and 0s of binary data.



2. Read and Write: The data-written center of the disc-is usually read back for verification purposes in much the same way a regular CD-ROM is read. A laser that's less bright than the beam that writes data reads it by flashing onto the data track and being reflected back through a prism onto a light-sensing diode.

3. Partial Write: Although you can't you can record more than one session on most of them. To do this, the drive adds header information to the outside of the disc to show where the new session begins, and then moves the write head to that free location and continues to burn data into the gold layer of the disc.

Pro- Playback drives-

CD-ROMs-are everywhere. Con: An expensive

platform to adopt not rewritable.

The Magneto-Optical Solution

For a durable, portable medium that you can write on and rewrite over, magneto-optical (MO) drives are an expensive but high-volume medium. The disks consist of aluminum and alloy layers sandwiched between a protective plastic coating. The drive uses both lasers and electromagnets to record data.

> 1. Prepare to Write: An intense laser beam shines on the spinning magnetooptical disk, softening up the alloy layer to a point where it can be manipulated magnetically. At normal temperatures. the alloy is stable, which makes it a much more durable medium than the magnetic coating on floopy disks or hard disks.

Oisks have a protective shell to

of playback hardware.



2. Write: A magnetic write head trailing the laser beam polarizes the softened alloy, charging its particles with positive or negative magnetic polarity for the 1s and Os of binary code. Since only the alloy that has been softened is magnetized, the tracks on a magneto-optical disk can be very tightly packed, fitting upwards of 1,3GB on a single disk.



BY MATTHEW LAKE

Tape drive designers use three technologies to ensure that what you store on tape is reliable and error-free. These include error correction codes (ECCs), preformatting, and read-after-write verification.

Error correction is based on statistics error probabilities rise geometrically rather than linearly. By ensuring redundancy through duplicating the data—you can more than double your data's security.

Coding Data Saves Space Complete redundancy also wastes space on the magnetic medium. And it's unnecessary. By properly coding the data, a few bits can monitor the condition of many.

Correcting errors requires more bits than does simple detection, but needs fewer bits than complete redundancy. The more bits devoted to an ECC, the greater the number of errors it can correct in each block. For example, by layering ECC with parity checking, minicartridge systems can fix up to three errors in a block of data.

Although that's fine for bit-level errors or a pinhole in the tape, the scheme falls apart with gross errors. A particle flaking off the tape may shed dozens of data bits, which ECC can't repair.

Tosting for Big Errors To detect large errors, inexpensive tape systems rely on qualifying each tape before they entrust your data to it. The initialization process used by familiar QIC-80 minetridges formats the tape with blocks corresponding to disk sectors, tests the tape, and removes bad blocks from use. Unfortunately, this process is time-consuming. Initializing a QIC-80 cartridge can take nearly an hour.

High-end tape systems, including nearly all data cartridge, DAT, and 8-millimeter drives, provide a fail-safe check of every bit using read-after-write technology. The drive writes a bit onto the tape, and then it reads the bit off again to verify that the bit was written into the magnetic medium.

Most read-after-write systems work at the bit level, monitoring the bits on the tape without regard to what they mean. Better systems check more deeply. For example, Exabyte's 8-millimeter systems read what's written from the tape, decompress the data, and then compare it to the original data supplied to the drive.

Read-after-write technology adds to the cost of a tape drive. It requires separate writing and reading heads as well as extra electronics to allow the write and read operations to occur simultaneously. Most inexpensive minicartridge tape systems avoid the extra cost by simulating read-after-write technology with tape verification. To verify a tape, a drive rewinds the tape and compares an entire completed backup to the original files. But verification doubles the time required for backing

up. Most tape manufacturers make verification an optional part of each backup session so that you can avoid the extra wait.

WINN L. ROSCH is a contributing editor to PC Computing and the author of the Winn L. Rosch Hardware Bible (Sams).

BUYER'S GUIDE

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Mass Media: Prices range from \$155 to nearly \$60,000, covering every backup and storage need on a variety of media.

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THE BOLOF RECOVERABLE DATA

Backup Is Your Data's Life-Insurance Policy

hat's the problem with backing up our PCs?
Everybody knows it's important, so how come nobody takes it seriously? I recently ran into a colleague sporting a long face. He explained that his 300MB hard drive had gone to the great computer store in the sky. So I asked him how old his backup data was. Silence. He doesn't

back up—period. Now, this guy is not a dolt. He eats bytes for lunch. He just felt lucky. This represents the victory of laziness over fear. Sound familiar?

Better Back Up The return on investment (ROI) of backup involves two stories. One deals with the mechanics of selecting the right device. The second (and more important) story deals with establishing procedures for backing up and deciding how and where it will be done.

Selecting the backup tool that's appropriate for your needs is the easy part. Justification is also straightforward: Compare the cost of the backup hardware to the cost of replacing the data.

The hard part is training people to use the equipment. While writing this column, my \$6,200 ThinkPad rolled over and played dead like a six-pound basset hound. No problem. My mother didn't raise any stupid children. I'd had my system backed up just two days earlier.

Proud of myself, I asked the LAN administrator to restore the data on a loaner PC. He had also run the backup. I watched in terror as he struggled to restore the data. The software was gagging on the tape and my stomach was filing with acid. Excuse me, Mr. LAN administrator, I asked, but did you read/verify the tape during the backup? "Oh no, that takes too long."

So I recovered my data from an earlier tape backup and floppy disks. This single-user disaster cost my company \$1,100 in lost productivity. Data disasters put people out of work. Recovering that work—and replacing the people who do it—is much more expensive than backup hardware.

Mainframe people see backup, network management, security, and database administration as ways to regain control of the crown. They have some good points, too. Most departmental servers and workstations are poorly administered. The data center offers trained staff, disaster recovery, hardware, funding, and security. The people there also understand the problem. After all, they've had three decades to make our lives miserable. The PC and LAN folks have less than one decade's worth of experience screwing things up.

However . . . Central backup definitely makes sense for data stored on the mainframe, but does it make sense for geographically distributed computing sites? Do we want to back up a server in Los Anceles at headquarters in New York?

Angeles at headquaters in New York?

There are also some tangible reasons why distributed backup must be decentralized, at least for the short term. Most

companies cannot back up all of their enterprise servers across the network without an expensive retooling. Also, mainframe storage hardware is expensive and floor space costs even more.

All of us are struggling with application interconnectivity in general. Why should backup be any easier? We'll need tools for central backup that function independently from the processor and the operating system. Stand in line.

Train Your Staff Backup is pinhead pabulum for diehard data-center types. My experience is that users and local support people are trainable. It takes a long time, but it can be done. The best strategy today is to back up corporate data centrally and department and personal data locally.

Regardless of which backup scenario with a payback period of three years or less. If the centralized strategy pans out, you will have to buy new technology that is not available today. In fact, the threeyear rule holds for most PC-related purchases. My ThinkPad should last so long.

MARC DODGE, a telecommunications department manager, is a regular contributor to PC Computing.

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Direct to You spec watch: Don't Settle for Less than These Specs

FOR YOUR EYES ONLY

Graphics Accelerators: Vroom!

Stop squinting and lay off the aspirin. If you're relying on a \$70 video board to produce the images you stare at for hours every day, you should treat yourself to a better display. Like a new coat of paint on a weather-beaten car, the right video card can turn your old headache-inducing. eve-burning monitor into a feast for the eves. With the flood

of applications from business graphics to multimedia and videoconferencing, a graphics card isn't enough anymore. What you need is a local-bus graphics accelerator, packed with memory, capable of resolutions from 640 by 480 to 1,280 by 1,024 pixels, all at 16.7 million colors. More memory isn't always better. So configure your card's memory to match up with your monitor. For example, a 15-inch monitor is best suited for 800-by-600-pixel resolution, With 938K

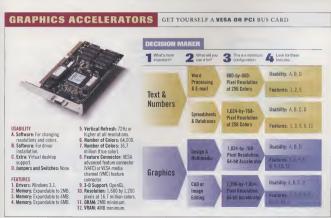
of RAM you can run 800 by 600 with 64,000 colors, so 1MB is your best choice. A 17-inch monitor can easily handle a resolution of 1,024 by 768, but you'll need 1.5MB of RAM to get the same 64,000 colors. So plan on 2MB, For a complete chart of video memory configurations, download VCHART.ZIP from PC Contact's data library 8 (Misc.), See page 316 for information about how to log in to PC Contact.

Video memory comes in two flavors:

VRAM and DRAM. If you use 1,024 by 768 at 256 colors or fewer stick with DRAM. But for working at higher resolutions with greater color depth you'll want the faster, dual-ported VRAM.

Local-bus architectures (VESA or PCI) are 32-bit buses that provide an enormous speed boost over 16-bit ISA. So if you're deciding on a new system. make sure it has a local bus. While there is a battle raging over which bus is better, most of the 64-bit accelerators (the onboard accelerator chip is 64-bit) are available in both flavors.

To avoid flicker, make sure your video card's vertical refresh rate is at least 72Hz. at all resolutions. And look for Windows 3.1 drivers that can handle resolution changes on the fly without exiting Windows. Finally, if you need full-motion video, look for a board that accelerates video playback as well. ADAM MEVERSON



Direct to You SPEC WATCH: Don't Settle for Less than These Specs

DESKTOP SYSTEMS

WHETHER A 486 OR PENTIUM, STOCK WITH RAM



- **IISARII ITY** A BIOS: Flash BIOS for easy
- upgrade.
- B Case: Tool-free cover
- C. CPU: ZIF CPU socket. D. RAM: Fasy access to SIMMs. E. Hard Orive: Enhanced IDF.
- FEATURES
- 1. CPU: 256K cache. upgradable to Pentium. 2. RAM: Expandable to 32MB. 3. Monitor: 17-inch.
- 4. Monitor: 21-inch. 5. Video: 64-bit VI -bus or PCI accelerator with 2MB of RAM. 6. Video: 64-bit VL-bus or PCI
 - appelerator with 4MB of RAM 7. Hard Orive: Enhanced IDE or SCSI-2
 - 8. Sound: 16-bit sound card (Sound Blaster compatible). 9. CD-ROM: Dual-speed drive.
 - 10. Slots: Three PCI or VL slots. 11. Ports: Two serial, one parallel, keyboard, mouse,

DECISION MAKER

Text & Numbers

What's mor important?

Processing

Spreadsheets

2 Batabases

Rendering &

Image Editing

& E-mail

This is a minimum SSMH2 4860X 8MB of RAM.

340MB Hard Disk 15-inch Monitor

Usability: A. B. C. D. E. Features: 5, 7, 8, 9,

Look for these

100MHz 4860X4 or Pentium. 16MB of RAM 500MB Hard Disk

Usability: A. B. C. D. E. Features: 1, 2, 4, 6, 7, 8, 9, 10, 11

Presentation: Drawing & Flowcharting Graphics, Design & Multimedia CAO. 3-0

66MHz 4860X2 16MR of DAM 500MB Hard Disk 17-inch Monitor 100MHz 486DX4 or Pentium, 16MB of Usability: A. B. C. D. E. Features: 1, 2, 3, 6, 7

Usability: A. B. C. D. E. RAM, 1GB Hard Oisk, Features: 1, 2, 4, 6, 7, 8,

PORTABLE PCs

COLOR RULES AT LESS THAN SEVEN POUNDS

What's more

important?

Deskton llse

Traveling

Machine



- USABILITY
- A. Oisplay: 9.5-inch active-matrix or dual-scan passive-matrix color display.
- B. Oisplay: 7.5-inch or larger dual-scan passive- or active-matrix color display.
- C. Weight: Total traveling O. Weight: Total traveling
- eight less than 7 pounds E. Key Spacing: Cursor controls and function keys at least
- half the size of QWERTY keys. F. Batteries: Swappable

- G. Battery Life: At least 4 hours with power management set at half mast.
- FEATHRES 1. RAM: Expandable to at least
- 20MB
- Slots: Two Type II (or one Type III) PC Card. 3. Slots: At least one Type II
- 4. Ports: Serial, parallel, VGA.
- keyboard, and PS/2 mouse. 5. Sound: Integrated sound chip.

DECISION MAKER

2 Primary activity? Multimedia, Application Graphics

Development, Word

Spreadsheets

75MHz 0X4 16MB of RAM 500MB Hard Orive

This is a minimum configuration: Features: 1, 2, 4, 5

Look for these features... Usability: A. C. E. F. G.

50MHz 4860X2 Processing 8MB of RAM. and/or

Usability: A. C. E. F. G.

Features: 1, 2, 4

Presentation: Communications

50MHz 4860X2. 8MB of RAM 170MB Hard Orive

250MB Hard Orive

Usability: A. C. E. F. & Features: 1 4 4 5

Word 33MHz 486. Processing. 8MB of RAM Spreadsheets 120MB Hard Drive **Oatabases**

Usability: B. D. E. E. &

Features: 3, 4

CD-ROM DRIVES

DEMAND DUAL- OR QUAD-SPEED AND MPC 2 COMPATIBILITY



HSARII ITY

- A. Ooor Cover: Double doors on
- drive to deter dust. B. Control: Output lack and manual volume control.
- C. Installation: IRQs set through software, not iumpers or dip switches.

FEATURES

1. Performance: 200ms access

- time or faster Interface: SCSI-2.
- Buffer: 64K or larger. Buffer: 256K or larger. Compatibility: MPC 2
- 6. Compatibility: High Sierra
- and Kodak Photo CD 8. Applications: Bundled CDs.
- 7. Compatibility: CD-Audio

DECISION MAKER Where will you use it?

Multimedia

5 or More Commercial

Titles

Titles

or More

Proprietary,

or Fewer than

Titles

Titles

Proprietary.

- 3 This is a minim
- Look for these features Quad-speed Orive Usahility- A. R. C.

Features: 1, 2, 4, 5, 6, 7, 8

Features: 1, 2, 4, 5, 6, 7, 8

Usability: A. B. C.

- with 150Khns to 600Khps Transfer Rate
- Dual-speed Orive or Fewer than with 150Kbps to 300Khns 5 Commercial Transfer Rate

 - **Dual-speed Driv** Usability: A, E C with 150Khns to 300Khps Transfer Rate
- with ASOKbos 5 Commercial
- Usability: A. & B.

NETWORK SERVERS THE PENTIUM IS STANDARD EQUIPMENT FOR MOST SERVERS

Text &

Static

Images



IISABILITY

- A. BIDS: Flash for easy upgrades.
- B. Enclosure: Tool-free removal. C. CPU Socket: ZIF.
- D. SIMMs: Easily accessible. E. Orive Bays: Fasily accessible.
- **FEATURES** 1. CPU Cache: Expandable
- 2. Upgrade Potential: Pentium ungradable
- 3. Interface: Wide SCSI-2.

- 4. RAID: Level 3 or 5. 5. RAM: Expandable to 128MB. 6. Bus Slots: Eight EISA with
- two VL or PC 7. Internal Bays: Two full-height 5%-inch. two 3½-inch.
- 8. External Bays: Two half-height 5%-inch with front-panel access.
- 9. Backup: DAT. 1D. Network Card: One 16-bit. 11. Network Cards: Two 16-bit. 12. Protection: UPS.

- DECISION MAKER How big is your

 - File Storage 20 or

 - Fewer Clients

21 or

More

Clients

- - - Application Services
 - 60MHz Pentium 16MB of RAM.
 - 1GB Hard Disk
 - 60MHz Pentium, 32MB of RAM.
 - Application Services

This is a minimum 66MHz 486DX2 16MB of RAM.

168 Hard Disk

- Usability: A. B. C. D. E.
- Features: 2, 5, 6, 7, 9,

Look for these

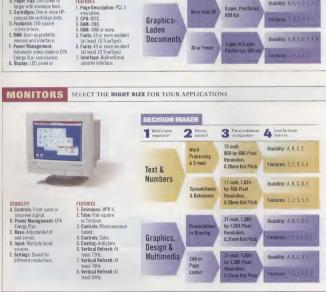
- Usability: A, B, C, D, E Features: 1, 3, 4, 5, 6, 7
- Usability: A. B. C. D. E.

Usability: A.B.C.D.E.

- Features: LN 4 5 6 7. 2GB Hard Disk
- 64MR of RAM
 - Features 1, 3, 5, 6, 7, 6

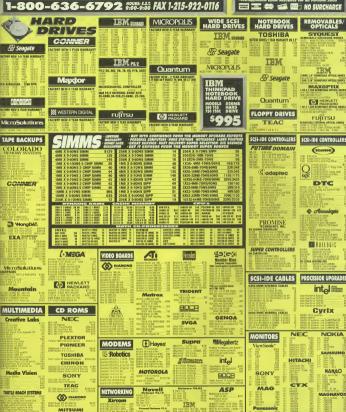
Direct to YOU SPEC WATCH: Don't Settle for Less than These Specs

LASER PRINTERS LOOK FOR 4 TO 8 PAGES PER MINUTE AND PCL 5 DECISION MAKER What will you 3 This is a minim Look for these features How many pages a day? Usability: C. D. F. F. G. 8 nnm. PCL 5. More than 20 Text & 300 dpi or Higher Features: 2.3.5.7 Simnle Rusiness Usability: B. C. D. E. F. G. 4 ppm to 6 ppm. Granhics 20 or Fewer PCL 5 300 doi software utility for paper or Higher Features: 2, 3, 5, 7 USABILITY jams, errors, and status. A Emulation Switching: Automatic, all ports active, 8. Paper Tray: 200-sheet or FEATURES Usability: A & C D E F I larger with envelope feed. 1. Page Description: PCL 5 8 ppm, PostScript C. Cartridges: One or more HP-More than 20 emulation. 600 dni compatible cartridge slots 2. CPU: RISC Granhics- Footprint: 260 square 3. RAM: 2MB inches or less. 4. RAM: 4MB or more, Laden E. RAM: User-up gradable 5. Fonts: 35 or more resident Documents Usability: A. B. C. C. F. F. B. memory and interface. (at least 10 TrueType). 4 pom të E apm. F. Power Management: 6. Fonts: 45 or more resident 2D or Fewer Automatic sleep mode or EPA (at least 10 TrueType). Energy Star compliance. 7. Interface: Bidirectional G. Display: LED panel or parallel interface. MONITORS SELECT THE RIGHT SIZE FOR YOUR APPLICATIONS DECISION MAKER



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Elite Pentium™ Processor The Power Is Building

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Based Systems...

Opening Doors Of Communication

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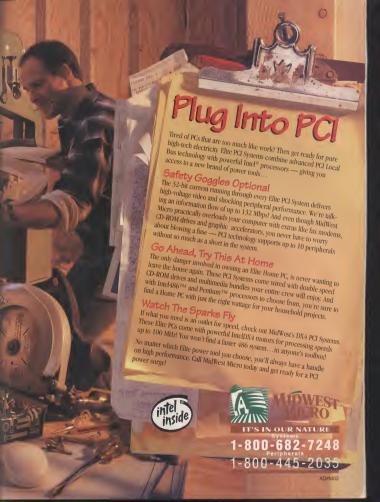
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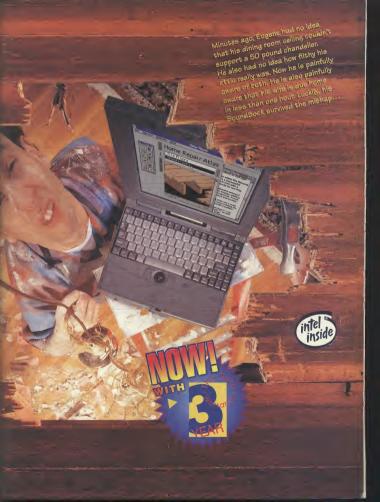
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with Hitachi CRT

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 - ► MS-DOS 6.22 and WFW 3.11
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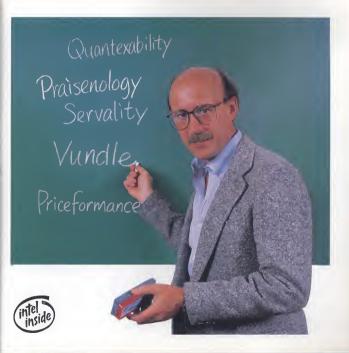
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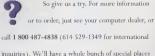
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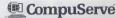
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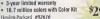
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Versa S/50C	323	701	Crtizen America HP Color LaserJet	41	606	E-Mail Connection 2.0 ConnectSoft	104	642
NEC Technologies			MBS					
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PERIPHERALS			Panasonic Communications & Systems Phaser 540	41	609	DataImport 4.0 for Windows	40	601
BACKUP DRIVES			Tektronix			Spalding	40	
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Modem Saver	313	680	Portable Software	30	037	Internet Assistant Microsoft	42	614
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Sampo Technologies						QuoteCom		
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ThinCardDrive Databook	64	624	and Electronic Publishing			MicroHelp		

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	REACER	NO.		READER SERVICE	NO.		REAGER	PAGE NO.
3Com Corporation	164	106-107	Dell Computer Corp.		C5-C8	NRI Schools	٠	251-253
Acer America		126-127			81-83		٠	271-272
	110	99-103	Delphi Internet Services Corp.	239	312	Number Nine Computers	150	13
Advanced Logic Research	140	27	Delrina Technology	284	39	Okidata	118	63
AGFA - Compugraphic	168	87		167	59	PCs Compleat	146	255
Alpha Software Corporation	245	176-177	Diamond Computer	107	205		147	256-25
America Online, Inc.		193-194	Digital Equipment Corporation		119-122	PC Zone	203	278-27
American Power Conversion	116	108-111	Epson	٠	2-3	Plextor	266	321
Anthro Technology Furniture		38	Everex Systems	228	139	Primavera Systems	198	46
APS Technologies	231	277	First Source International		270	Prodigy		151-15
Arlington Computer Products	160	276	Ford NAAO		211-213	PSI (Performance Systems Int'I)	189	316
Artisoft	175	94-95	Gateway 2000	٠	131-134	Quantex	٠	247-25
AST Computer	119	91			17-25	Radius	194	44-45
AST COMPARE	196	93	IBM - PC Direct		144-145	SAGER	٠	258-25
	100	33-35	IBM Personal Software Products		28-29	Samsung Electronics America	139	105
AT&T Global Information Solutions			ImagiNation Network		281A/B	Scitor	٠	75
Autodesk Retail	·	167	Insight	279	268-269	Software Publishing	٠	156
Automap	·	201		209	274-275	Sony Corporation	٠	65-72
Avery Dennison	•	96		103	273	Sunshine Computers	٠	232
Caere Corp		170-171	Inspiration Software		16	Symantec Corporation		197
Claris Corporation		191	Kensington	178	225	Tektronix, Inc	123	143
Clear Software	217	173	L.A. Trade		260	Toshiba	215	14-15
Colorado Memory Systems	184	203	Lexmark	162	155	Touchstone Software Corporation	172	26
Comp USA	190	175	Lotus		76-77	Twinhead Corp.	159	199
Compaq Computer Corporation	274	4-5	Matrox Electronics	155	89	US Robotics		136-13
	109	60	Megahaus	105	254	USA Flex	202	264
Compuserve		261-263	Micron		10-11	ViewSonic	171	54-55
Computer Associates	252	30	Microsoft		208-209	WordPerfect Corporation		159-16
Computer Book Club		281-283			216-217			165
Computer Discount Warehouse	144	265			8-9	Worldwide Technology	251	237
	143	266-267	MidWest Micro	237	238-246	Zeos Int'i	265	48
Conner Peripherals	148	37	MPC Technology Inc.	232	273		282	50-51
Corel Corp.	230	129	Nanao	*	207	ZD Press		12
	229	78	NECTechnologies	182	C2-C4.1	ED I TOO		227
	200	85	Net Manage	129	317	FYI		11,
Construct also	253	318			43	Direct to You Section	2	29-283
Creative Labs			Net Manage-Ecco	138		PC/Computing Marketplace		86-309
Datastorm Technologies Inc.	170	52	NetCom		315			285

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297-309

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Index	Premier	Classified		Premier	Classified		Premier	Classified
HARDWARE Boards/Components/Chips Communications Voice Mail Computer Systems Input/Qutput Devices	287 288 289	297 300 300 301	SOFTWARE Accounting Bar Coding Business Applications Communications Education	289 289 289 289	302	Utilities Adult Windows MISCELLANEOUS Digital Output Service SUPPORTING PRO	S	306 305
Bar Coding Mass Storage Devices Midi Networking On-Line Services Security	289	302	Financial Graphics/Design Multi-media/CD-Rom Music/Midi Public Domain Shareware	293 294	303 304 303 305	Accessories Digital Output Service Disk Duplication Information Resources Services Supplies	s	305 305 305

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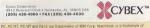
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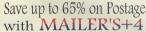
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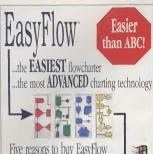
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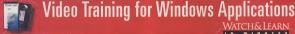
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476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 576 577 578 579 580 581 582 563 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 PLEASE PRINT CLEARLY DCC 2/05-4 Please enswer questions below Name 1. Where do you use your compute 8 - Susiness C. T Both

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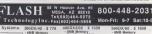
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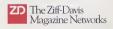
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- At the PASSWORD prompt, type PC/CONTACT and press Enter.
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Cinemania '95 / Microsoft Home / (800) 426-9400, (206) 882-8080 / \$59.95 est. street price / Reader Service No. 600



MEGA MOVIE GUIDE 3.0 000 Mega Movie Guide is the peren-

nial other movie CD. Version 30's new Windows look is easier to use and easier on the eyes, although it still needs some de-kinking. For example, in *The Glem Miller Story*'s summary screen you click the button that indicates it won an award and are sent to the 1954 Academy Awards. But then you have to find the movie again but vourself—a tot of searching.

Mega Movie Guide claims \$2,000 movie reviews and \$91 film clips—roughly twice as many as Cinemania '95. Also, it has a nice Greatest Hits feature that displays the films by decade. Nevertheless, this CD is not as satisfying as Cinemania '95. Most of the reviews are short and anonymous. (Rex Reed writes only 1,000 of them, and be's no match for the Ebert-Kael-Maltin



More, But Less: Mega Movie Guide bests Cinemania in quantity, not quality.



combination in Cinemania '95', There's novie industry info either, and the ratings are inconsistent: Depending on whether you're looking at a summary, synopsis, or "in-depth" sereen, Jurassic Park is rated two stars, three stars, and three-and-a-half stars. And nowhere does Mega Movie Guide say who provided these ratines.

To make matters worse, more than a dozen of the film clips are trailers for 1994 films. Sure, trailers are fun to watch, but I can't help feeling that when you limit film clips to only 39 movies, The Flintstones and Timecop don't really belong.

Mega Movie Guide 3.0 / InfoBusiness / (800) 657-5300, (801) 221-1100 / \$39.95 est, street price / Reader Service No. 697



CRITERION GOES TO

If you're a movie connoisseur—which means you know the difference between Ingrid Bergman and Ingmar Bergman—then you tego to have Criterion Goes to the Movies. This Windows CD is actually an infomercial for the laser-disk movies in the Criterion Collection. But even if you don't have a laser-disk player, you'll appreciate the clips from 140 films—each one a bona fide classic.

Limited to these 140 films, Criterion doesn't have the breadth of Cimemania '95 or Mega Movie Guide, but the clips are carefully chosen and the newer films are presented in their original wide-screen format—something I haven't seen on an other dise about movies. There are no reviews from big-name critics, but an essay that's intelligent and hypertexed to other data on the dise accompanies each film. This CD is a tiny gent

Criterion Goes to the Movies / Voyager / (800) 446-2001, (914) 591-5500 / \$24 est, street price / Reader Service No. 692

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EPHEMERAL FILMS 1931-1960 0000

Around the start of the sixties most of us traveled to a new universe called the modern world. Media archaeologist Richard Prelinger has collected educational films about the old universe on a Windows CD-ROM called Ephemeral Films 1931-1960, A 1951 film called Dating Do's and Don'ts warns young men against lunging for a good-night kiss (a similar film today would cover the correct use of a condom). Another film tells how the housewife of 1957 can achieve a stress-free life through tranquilizers. Yet another clip envisions a chrome-plated robot alleviating the drudgery of kitchen work. There are moments when that lost innocence is a bit sad. But mostly it's just a hoot.

Ephemeral Films 1931-1960 / Voyager / (800) 446-2001, (914) 591-5500 / \$24 est, street price / Roader Service No. 693



SECRETS OF STARGATE

If you're not a major sciencefiction fan, skip to the next review. Now, how many of the rest of you think that Stargate is better than 2001: A Space Odyssey, Blade Runner, and Star Wars? You need all the devotion to Stargate that a Trekkie has for Star Trek to appreciate this Windows disc. A CD-ROM could have been a perfect medium for showing how some of the special effects were done, but no, that would be too interesting, Instead, Secrets of Stargate is a collection of clips and interviews with some of the people who made the film. Unless Stargate changed your life, don't get this CD.

Secrets of Stargate / Compton's NewMedia / (619) 929-2500 / \$30 est. street price / Reader Service No. 604



THE MASK: THE ORIGIN OOO

The best thing about The Mask: The Origin is that it doesn't have this generation's Jerry Lewis-Jim Carrey-in it. This Windows CD is a very literal translation of the politically incorrect comic book that inspired the recent film. It consists mostly of illustrations with actors reading speech balloons. There's none of the special-effects wizardry you would expect after seeing the movie. Still, it's not as dorky as it sounds, at least not if you have a history of comics in your childhood.

The Mask: The Origin / Cambrix Publishing / (818) 992-8484 / \$25 est. street price / Reader Service No. 695



A BRIEF HISTORY OF TIME OOOOO

Did you spend the sixties wondering what time really was, how the universe got started, and where it will end? Once the sixties ended, did you give up those questions? They're still valid, and A Brief History of Time on CD-ROM takes a quantum leap toward giving the answers. The entire text of Stephen Hawking's best-selling book is here, but exploring the universe through the disc's animations, graphics, and narration is better-especially with Hawking's computerized voice. You can explore ideas in any



Hawking's Universe: Cartoony graphics belie brain-baffling physics.

order or take a guided tour. Some interface touches are clever, such as the Hawking Craft that flies to black star Cygnus X1. Despite a sugar-coated interface, there's some meat to this CD. It requires diligence to comprehend such concepts as entropy and quantum physics. The good thing is that there's no pop quiz afterwards.

A Brief History of Time / Creative Labs / (800) 998-5227, (408) 428-6600 / \$35 est. street price / Reader Service No. 696



RANDOM HOUSE FLECTRONIC DICTIONARY OCCOO

It's hard to knock the newly revised 315,000-word Random House Unabridged Electronic Dictionary on CD-ROM, Add 2,200 line-art illustrations and 115,000 spoken pronunciations for those hardto-decipher words, and the result is a must-have reference tool. The other big unabridged CD-ROM dictionary, the Oxford English Dictionary, sells for hundreds of dollars. This bargain goes for \$79, and for \$21 more you also get it in hard cover. That's a deal that can't be beat.

Random House Unabridged Electronic Dictionary / Random House Reference and Electronic Publishing (800) 733-3000, (212) 751-2600 / \$79 est, street price / Reader Service No. 697



THE WAY THINGS WORK 00000

Excuse me for a second. This CD is so great I feel tears welling up. I'm not being sarcastic. The Way Things Work, based on David Macaulay's terrific 1988 best-selling book, is a work of genius. It explains everything from simple levers to microprocessors, but expands on the book's whimsical drawings with animations, spoken parration, and a cast of woolly mammoths that subtly illustrates scientific principles. (The qualities of pitch and volume, for example, are illustrated by plucking a mammoth's tail.) As in some of the best children's games, clicking on various objects in an illustration will often produce some surprises, from a noise to a bit of slapstick. The only problem with this CD is that it's not a dedicated research tool. Rather, it's best to simply let one explanation lead you to another. They're all equally lucid in their descriptions of science and mechanics, and they're all beautiful fun.

The Way Things Work / DK Multimedia / (800) 225-3362 / \$49.95 est, street price / Reader Service No. 698



Mammoth Fun: David Macaulav's explorations fill a killer CD-ROM.

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BY MATTHEW LAKE

NINETY-SOMETHING?

The Official Story: December 20, 1994—Microsoft today announced that Windows 95 may not be available until August 1995. The company made this announcement based on its continued commitment to deliver a vigorously tested product of the highest quality . . . Brad Silverberg, senior vice president of the Personal Operating

Systems Division at Microsoft, said, "We have always said we will ship this product when it is ready, and that is what we are committed to do."

The Inside Story: There are two kinds of people—those who believe in conspiracy theories, and those who are too blind to recognize a conspiracy when they see one.

Will you really be able to buy a shrink-

wrapped copy of Windows 95 in August of this year? Take the new, offi-

cala release date with a grain of salt. In fact, after reading through a mountain of old news clippings, I've decided to buy my own salt mine. I've also filed the whole mess under W, for "Wishful Thinking."

Maybe someone settled on the Windows 95 logo too early. Maybe it's time to bring back the Chicago code name. Maybe Windows Ninety-something is more like it. Maybe the conspiracy theorists are right after all.

Take your pick from the following assortment of semiplausible explanations for Why Windows 95 Is Taking So Damned Long:

• Microsoft is plotting to sink Lotus and WordPerfect. While its rivals sink precious R&D dollars into 32bit Windows 95 upgrades, their 16-bit versions sit on the shelves. Meanwhile, Microsoft is selling 2 million copies of Windows 3.1 and DOS per month. Windows 95 is a pipeline full of profits that Microsoft can turn on anytime. Better to wait until the competition is suitably softened up. Check the second-quarter earning forecasts before settling on the real release date.

 Windows 95 is just a placeholder for NT. John C. Dvorak started this one by labeling Windows 95 an "insincere" product. Dvorak the conspiracy theorist Jays it out like this. "By stalling on Chicago... and recently issuing ediets to software developers about use of the Windows logo, Microsoft has signaled its true intention: To publicity. It would have worked, too, except that the Pentium's floating-point bug stole all the headlines.

• It was an innocent mistake. The schedules were calculated using first-generation Pentiums and the floating-point errors got worse and worse each time someone pushed.

rushing a buggy version of OS/2 Warp to market and reaping a bumper crop of bad

Pentiums and the floating-point errors got worse and worse each time someone pushed Excel's recalc button. (You didn't read about that one? Obviously a cover-up.)

• It's the Uma Thurman virus. I don't have all the details yet, but it has something

have all the details yet, but it has something to do with Penn Jillette, who's angry that PC Computing is plastering Windows 95 all over bis page. Apparently he sent an irresistible screen-saver module to a few key developers in Redmond and the disk had a little something extra on it.

. It's the ultimate conspiracy theory.

The steady stream of embarrassing delays is designed to lull competitors into a state of smug complacency, sort of like the feeling you get after a full turkey dinner. While they aim for the new August deadline, Microsoft secretly has everything ready and releases Windows 95 plus a new version of Office in July. Three months later there's a new version of Windows NT with the Windows 95 interface seamlessly grafted on. I can't take credit for this one-the original concept is straight out of a classic

Harlan Ellison sci-fi story. Microsoft's Silverberg insists that the Windows 95

development team is on course. He says they've been concentrating since the first of the year on the Herculean task of debugging the new operating systems of it installs flawlessly, even on systems stuffed to the gills with ancient hardware and clunky old DOS and Windows applications. Sound reasonable to you? Then you have no future in the conspiracy business.



Spring Break in Seattle? August might as well be in the next millennium—the Windows 95 target date to watch is March 31, when the \$30 Preview edition (a.k.a. version 1.0) is due.

make Windows NT the desktop standard."
This column appeared in PC Magazine on
the 31st anniversary of JFK's assassination.
Coincidence? There are no coincidences.
According to this theory, the new Windows will ship on November 22, 1995.

*IBM walked right into Microsoft's trap.

The unrealistic early deadlines for Windows 95 were a ploy to trick IBM into

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